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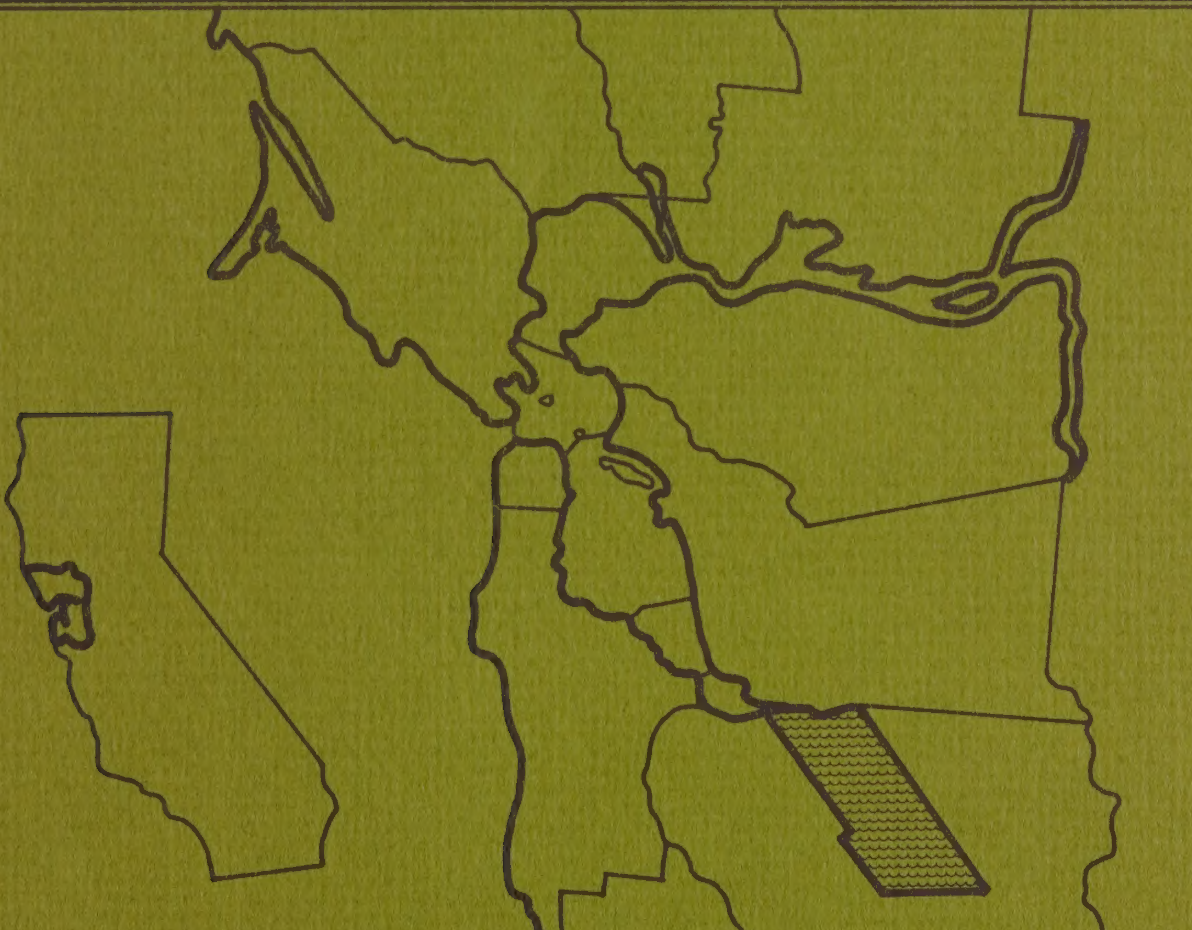
DRAFT
Environmental Impact Report

on the Santa Clara County Flood Control and Water District East Flood Control Zone Project

Volume I



A URS Systems Affiliate

URS RESEARCH COMPANY

SANTA CLARA COUNTY
FLOOD CONTROL
WATER DISTRICT

5750 ALMADEN EXPRESSWAY • SAN JOSE, CALIFORNIA 95118 • (408) 265-2600

Enclosed for your review is a copy of the Draft Environmental Impact Report on the Santa Clara County Flood Control and Water District's East Flood Control Zone Project.

Because of the limited availability of construction funds from the current East Zone ad valorem tax and the large cost of projects that will be needed to eliminate flood hazards, the District Board of Directors is presently considering a bond issue to finance the improvement of an as yet undetermined number of the eighteen creeks covered by the report. This report was prepared to provide information to assist the Board in selecting those creeks to be included, or not included, in a possible bond issue and to inform them of the environmental impact of such improvements.

Your comments on the Draft Environmental Impact Report are solicited and should be submitted to the District in writing by Friday, January 25, 1974.

For your information, the technical appendices referenced in the report are available for review at the District office, 5750 Almaden Expressway, San Jose, California and at the locations listed on the enclosed sheet. A copy of the Engineer's Report fully describing the creek improvements presently proposed will be forwarded to you in approximately two weeks.

A public hearing on the Environmental Impact Report and the Engineer's Report will be held after receipt and evaluation of all written comments. You will be notified of the time and place in advance.

If you have any questions relative to this report please contact the undersigned or Dr. Bernard H. Goldner, Environmental Specialist, at 265-2600.

Sincerely yours,

David K. Gill

David K. Gill
Advanced Planning Manager

Enclosure

Locations where Appendices to
Environmental Impact Report on
East Flood Control Zone Project
are Available:

City Clerk's Office
City of San Jose
801 North First Street
San Jose, California

Santa Clara County Library
Alum Rock Branch
2874 Alum Rock Avenue
San Jose, California

City of San Jose Library
Alviso Branch
1060 Taylor Street
San Jose, California

Santa Clara County Library
Main Branch
10400 Torre Avenue
Cupertino, California

Santa Clara County Library
Community Center
160 North Main
Milpitas, California

Santa Clara County Library
Sunnyhills Branch
115 Dixon Road
Milpitas, California

City of San Jose Library
Hillview Branch
2255 Ocala Avenue
San Jose, California

City of San Jose Library
Main Branch
180 West San Carlos
San Jose, California

Santa Clara County Library
Fiesta Shopping Center
Milpitas, California

Santa Clara County Library
Morgan Hill Branch
17575 Peak Avenue
Morgan Hill, California

City of San Jose Library
Berryessa Branch
3311 Noble Avenue
San Jose, California

City of San Jose Library
East San Jose Branch
23rd and Santa Clara Streets
San Jose, California

City of San Jose Library
Seventrees Branch
3597 Cas Drive
San Jose, California

City Clerk's Office
City of Milpitas
455 East Calaveras Boulevard
Milpitas, California

ENVIRONMENTAL IMPACT REPORT

on the

Santa Clara County
Flood Control and Water District

EAST FLOOD CONTROL ZONE PROJECT

VOLUME I

A URS Systems Affiliate

URS RESEARCH COMPANY
155 Bovet Road, San Mateo, California 94402 (415)574-5001

ACKNOWLEDGMENT

The URS Research Company project team wishes to acknowledge the full support and assistance of the Santa Clara County Flood Control and Water District technical staff in performing this study, and in preparing the draft EIR. The District's staff has been fully and promptly responsive to requests for data, information, and technical reviews.

The project staff would particularly like to acknowledge the outstanding cooperation and leadership of Mr. David K. Gill, Advanced Planning Manager, and Dr. Bernard H. Goldner, Environmental Specialist, Project Evaluation Division.

The project team would also like to draw attention to the significant contributions made by individuals, private and public groups, and others whose assistance is recognized in Sections XI and XII of this report.

NOTICE

The URS Research Company, San Mateo, California, has prepared this draft Environmental Impact Report on the Santa Clara County Flood Control and Water District East Flood Control Zone Project, and believes it to be in conformance with District and State of California guidelines under the California Environmental Quality Act of 1970. While URS Research Company vouches for the correctness of the technical analyses contained herein, the Company does not assume responsibility for subsequent legal interpretation which might result during the review of the document.

The following staff of the URS Research Company were involved in the performance of this study and the preparation of the draft Environmental Impact Report.

Franklin J. Agardy, Ph.D.
Project Director

Phillip J. Morris
Project Manager

Marty Abell
Gary Amy
John Butt
Robert Castle
Menahem Eldor
Lois Goodman
Jack Jenkins
John Kiefer
Robert Pitt
Donald Sanders

Eric Schrier
Rameshwar Singh, Ph.D.
Barbara Westree
C. Thomas Williams, Ph.D.
Thomas Schultz, Ph.D., Transportation Consultant
Francis Maurier, Editorial Consultant

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Section I

INTRODUCTION

I INTRODUCTION

The Santa Clara County Flood Control and Water District is considering a bond election to raise funds for the construction of flood control facilities on 18 streams in the District's East Zone. This Environmental Impact Report (EIR) has been prepared for the District by the URS Research Company at San Mateo, California in order to comply with the California Environmental Quality Act of 1970 and the Resolution of the District's Board of Directors entitled "Adopting Local Guidelines Implementing the California Environmental Quality Act of 1970, As Amended." The primary intent of this EIR is to inform the public, public agencies, and the District's Board of Directors of the environmental consequences of the action contemplated by the District.

The EIR is organized into two basic parts. Volume I contains the general information required in EIRs and is designed for wide distribution. Volume I will have distributed with it a folder of exhibits visually presenting certain information discussed in the EIR. Volume II is a collection of appendixes which present detailed supportive information generated during environmental inventories and impact analyses. All of the items, exhibits, appendixes, and volumes herein described constitute the Environmental Impact Report.

Frequent references are made in this report to the Detailed Project Description and General Plans and Maps found in the District's report, "East Flood Control Zone Planning Study." This report is available for review by interested agencies and individuals upon request. A summary description of the proposed project is given in Section II of this EIR.

Section II

DESCRIPTION OF PROJECT

II DESCRIPTION OF PROJECT

A. Location

The location of the East Zone flood control project is in the northern portion of Santa Clara County, San Francisco Bay Region, State of California (see Figure II-1, the regional map). The local map, Figure II-2, shows the location of the East Zone, which embraces the watershed of Coyote River and its tributaries. It is the construction of flood control facilities for 18 creeks in the East Zone which constitutes the project.

FIGURE II-1 REGIONAL MAP

FIGURE II-2 LOCAL MAP

B. Objectives of the Project

The basic objective of the proposed project is to provide protection against flooding (and associated damage and risk to life and health) by the streams of the Coyote Creek watershed.

The hydrology of Santa Clara County is greatly variable, with extremes of extended drought and destructive floods. Uncontrollable flood flows have the potential for doing considerable damage to man, his works, and his environment. Exhibit A illustrates those parts of the District's East Zone which have been flooded in the past and those parts which may be flooded by a flood that, in the long-term average, would occur once in a period of 100 years.

In a broader context, the Santa Clara County Flood Control and Water District recognizes that the basic objective of the proposed project must be consistent with three basic principles to which the District, in conjunction with other public agencies and citizens of Santa Clara County, will adhere. These are that it is necessary to: (1) control recurrent flooding that would be detrimental to the health, safety and welfare of the people working and residing in the District; (2) promote sound land use planning in natural floodable areas; and (3) preserve natural waterways and retain open space to support environmental protection, visual enjoyment, and recreational opportunities.

C. Description of Construction and Characteristics

The project consists of various types of stream channel treatments and associated facilities proposed to provide protection to currently floodable areas in the East Zone. The design criterion used to designate the floodable areas and to determine the peak flows which the various stream channels must carry is the 100-year flood. This design criterion, which is in common use, represents a statistical evaluation of the frequency and severity of floods. More specifically, a 100-year flood has a probability of occurrence of 1 percent in a given year, and is predicated upon saturated ground conditions as opposed to a 100-year storm.

The detailed project description and the general plans and maps for each reach of each stream are found in the District's report, "East Flood Control Zone Planning Study," December, 1973. The following general discussion of the proposed construction will serve to quickly familiarize the reader with the proposed project.

There are five basic types of channel treatment; one of these is to leave the channel in its natural state. The other types include modified floodplain, trapezoidal earth and concrete channels, concrete-lined channels of vertical or nearly vertical walls, rock-lined channels, and buried concrete pipe or box. The basic approach of the modified floodplain type of treatment is to retain the existing channel as much as possible and to provide the necessary flood protection by levees which usually vary in height from 0 to 6 feet. This type of treatment is shown in Figure II-3. In some instances an excavated channel paralleling the existing channel may be constructed to provide additional flow capacity.

There are many variations on the basic trapezoidal channel treatment, depending on whether the maintenance roads are at grade or depressed, and

on whether the channel is earth-lined, concrete-lined, or rock- or gabion-lined. These variations are illustrated in Figures II-4 through II-7. Figure II-8 shows the concrete channel type of design, and Figure II-9 illustrates the concrete pipe or box design. Both of these latter two design types are to be used where there is current development abutting the right-of-way, where there are no existing channels, or where steep slopes cause erosive velocities. The depression or swale for the concrete pipe or box design is intended for access, overland flows, and emergency flows from spillways of sediment control facilities. These facilities are generally located at the end of the project plan for a stream to catch sediment and debris carried by streams emerging from the foothill canyons.

The types of channel treatments proposed for the various creeks or portions of a creek are shown on Exhibit B. The proposed schedule of construction is given in Figure II-10. To further describe the proposed project, a summary description of improvements proposed for each creek is given below.

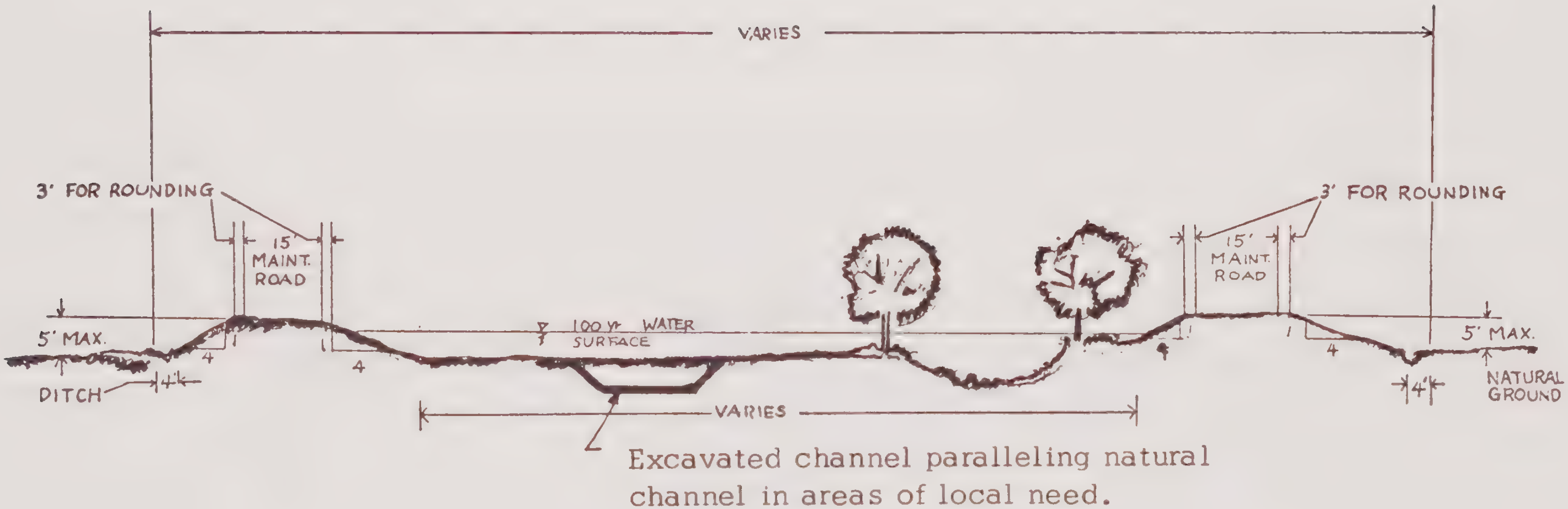

FIGURE II-3 TYPICAL SECTION FOR MODIFIED FLOOD PLAIN
(Maximum levees height 5 ft; 4:1 side slope on levee desirable; design of levees subject to modification to fit local need)

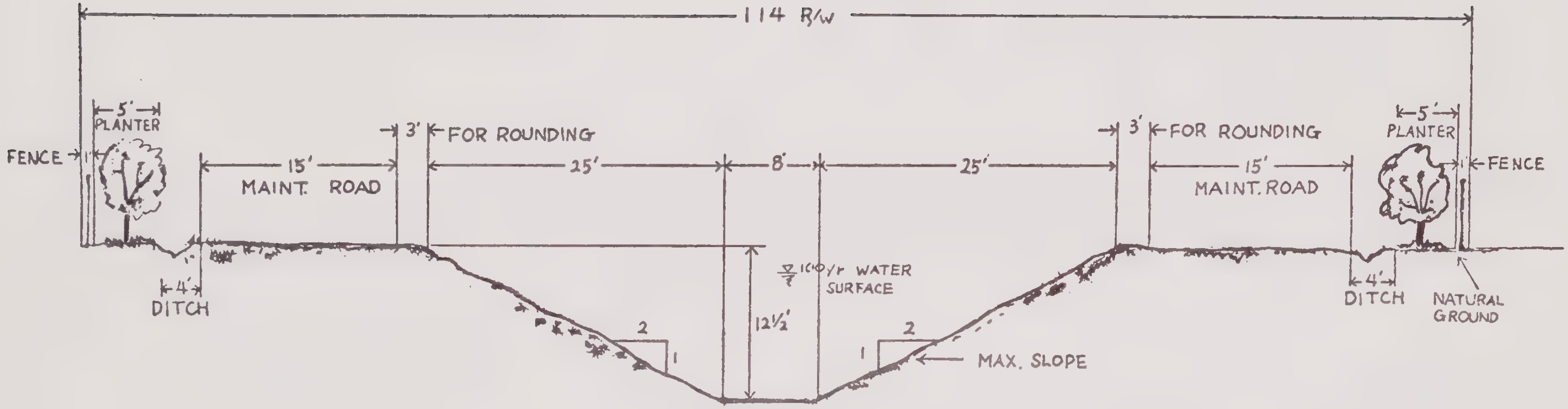

FIGURE II-4 TYPICAL SECTION FOR TRAPEZOIDAL CHANNEL WITH NO DEPRESSED ROAD
(2:1 slope)

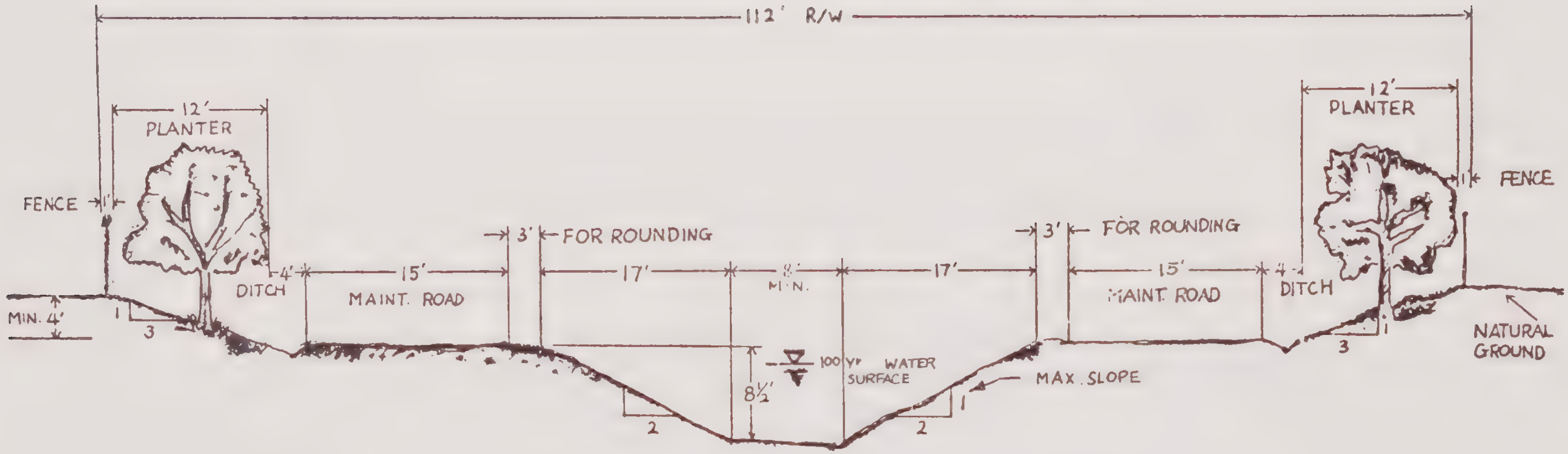

FIGURE II-5 TYPICAL SECTION FOR TRAPEZOIDAL CHANNEL WITH 4-FOOT DEPRESSED ROAD

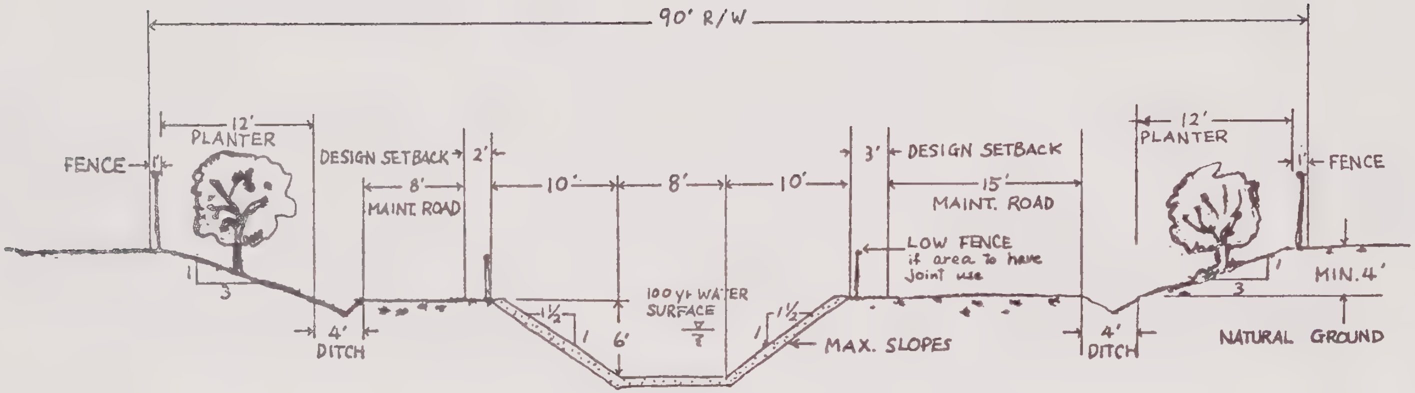

FIGURE II-6 TYPICAL SECTION FOR CONCRETE-LINED CHANNEL WITH 4-FOOT ROAD
(3:1 slopes in planter area)

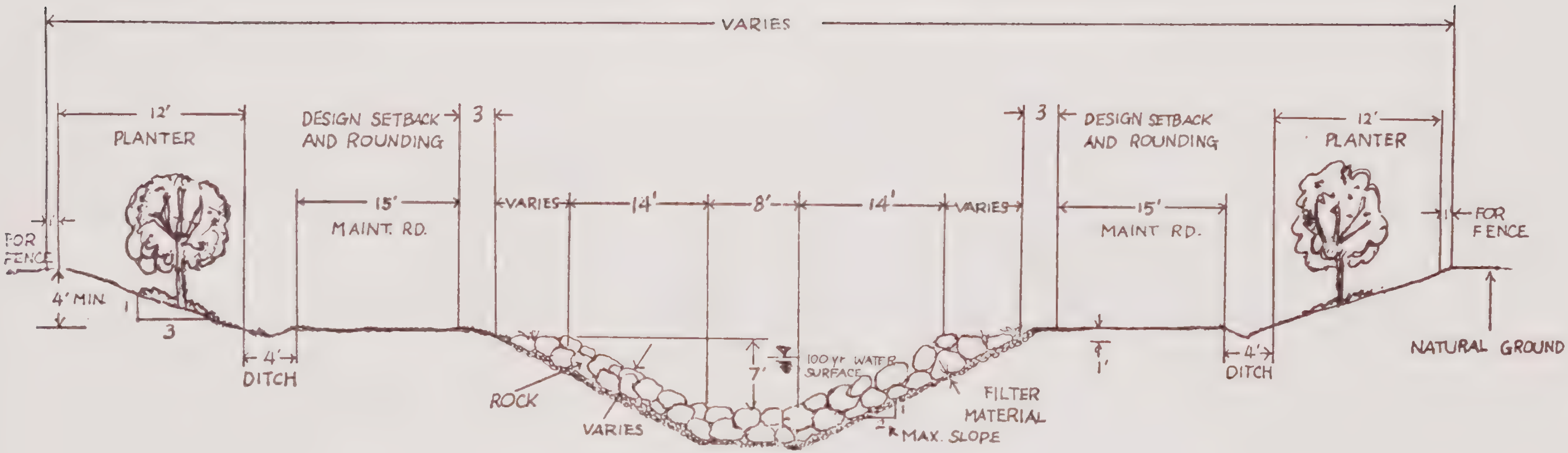

FIGURE II-7 TYPICAL SECTION FOR ROCK-LINED OR GABION-LINED CHANNEL WITH DEPRESSED ROAD (Always use depressed road with rock-lined section; minimum of 4 ft. depressed road)

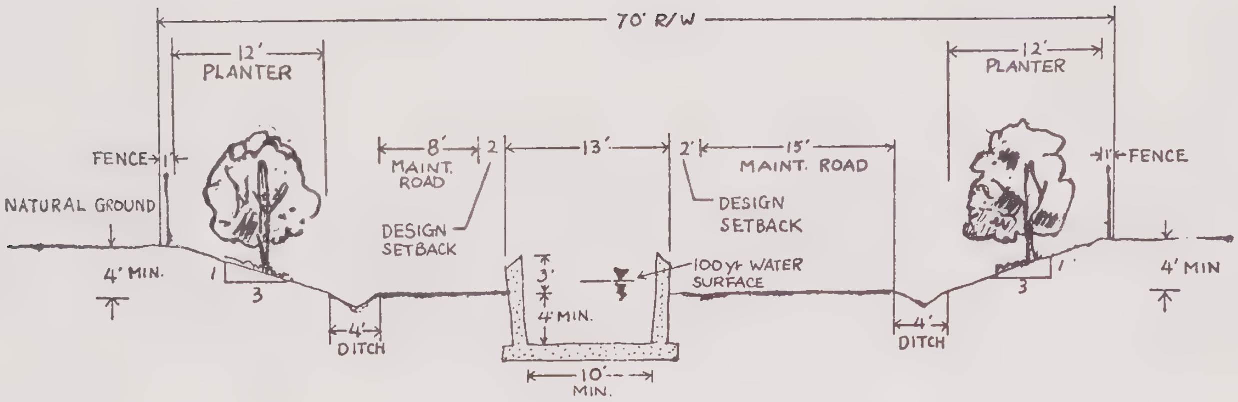

FIGURE II-8 TYPICAL SECTION FOR NEAR-VERTICAL CONCRETE CHANNEL WITH DEPRESSED ROAD (Minimum 4 Ft. depressed road; minimum 2 ft. design setback; minimum total depth 8 ft.)

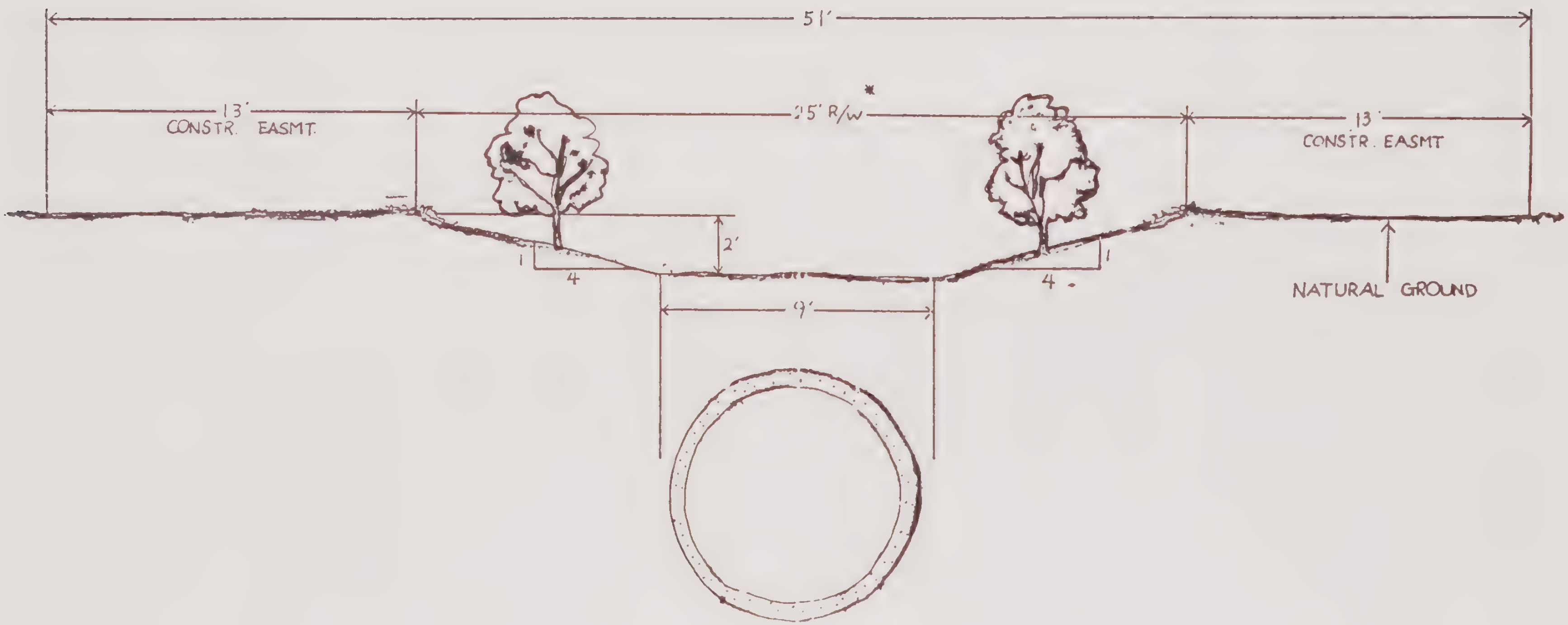

FIGURE II-9 TYPICAL SECTION FOR PIPE OR BOX
(Minimum R/W width 25 ft.--increase depth of depression to 3 ft. and R/W to 33 ft. in areas where alignment of channel is in back of lot)

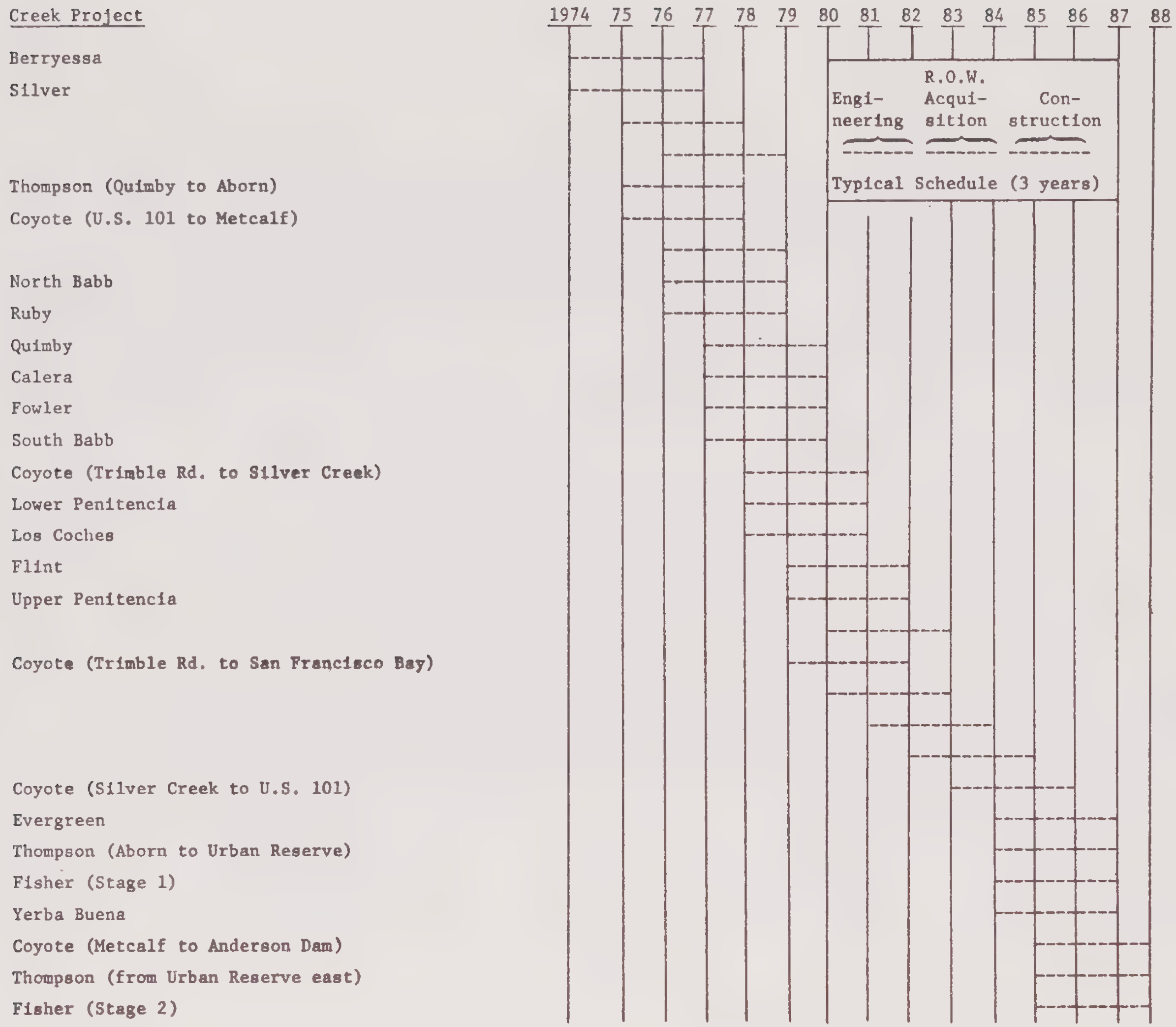

FIGURE II-10 PROJECT SCHEDULE

Description of Creeks and Proposed Improvements

Complete details of flood control improvements are included in the District's description of East Zone projects. [redacted] A brief summary of the creeks to be improved follows.

Coyote Creek

The proposed flood control improvements to Coyote Creek extend from the downstream end at San Francisco Bay to the upstream end at Anderson Dam, a total length of 35.1 miles. The improvements consist of modified floodplains, excavated trapezoidal earth channels, and combinations of these. At this time Coyote Creek has flood control improvements over only a few short reaches. In the lower reaches close to the bay, a modified floodplain approximately 1,100 feet wide, with low flow channels, is to be provided by constructing levees on both sides. Salt ponds outside the levees will be connected with siphons. Borrow areas for levees in lower reaches will be located north of Trimble Road between Coyote Creek and Highway 17. Twenty-foot-deep borrow pits will be dug and will later be used as a recreation lake. Design flows on Coyote Creek vary from 20,000 cfs near Anderson Dam to 24,000 cfs near San Francisco Bay. In most of the sections of stream, levees are planned for one or both sides of the channel, with provision for leaving the creek in a natural setting. In some places, the plan stipulates natural channels with adequate setbacks and maintenance roads which require removal or flood-proofing of buildings. Double channels, riprap with or without grouting, retaining walls, and flood walls to protect valuable properties are also parts of the project. An energy dissipator will be required near the confluence of Fisher Creek since the Coyote Creek channel bottom will have to be lowered to meet the Fisher Creek design channel bottom.

Some pipelines and utility roads will need modification and readjustment. At the confluence of Silver Creek and Coyote Creek, two channels will be excavated to create an island for picknicking near the proposed park. Coyote Creek has about 43 points where it can be crossed during low flows or in summertime. There are 25 major all-weather bridges. Under the proposed flood control improvement plan, many of these all-weather bridges are found to be inadequate to pass the design flow. Hence, the plan includes modification, replacement, removal, or construction of about 10 major bridges along Coyote Creek.

Berryessa Creek

Berryessa Creek originates in the hills east of San Jose. Its watershed above its confluence with Penitencia Creek in Milpitas is 17.3 square miles, of which about 70 percent lies in the hills. It contains five major tributaries -- Sierra, Crosley, Piedmont, Los Coches, and Tularcitos Creeks.

The upper strata of soils and rocks in the hills consists of unstable material along the faults. During floods, water carries down a heavy sediment load. The valley portion of the watershed still contains agricultural lands and orchards, but urban development is creeping in on the watershed. The present channel of Berryessa Creek is incapable of handling the design flow. Due to subsidence in this region, present culverts and crossings are below the flood stage.

The design flow for Berryessa Creek is 4,100 cfs. The proposed improvements to the creek extend over a length of 30,500 feet and include modified floodplains, earth channel sections, reinforced concrete box conduits, bridges, culverts, drop structures, a sediment control facility, and an energy dissipator. The sediment control facility is planned at the upstream end of the construction to trap the coarse sediments coming down the hills. Other such facilities could be added later on if needed. Based on the data from North Fork Reservoir on Pacheco Creek, approximately 1.5 acre-feet may be deposited annually in the basin at the foothills. Above the

debris basin, the creek is in a deep, well-defined arroyo with little chance of any flooding.

Calera Creek

Calera Creek, a tributary of Berryessa Creek, originates in the hills northeast of Milpitas. It has a watershed of about 1,850 acres in northeastern Santa Clara County. Most of the watershed is in steep, hilly terrain, ranging up to 2,400 feet elevation, and is currently used for rangeland and grazing. About 500 acres of watershed lie within the gently sloping valley floor, and most of this is presently in orchards and grains, with some fallow lands.

The creek is approximately 4 miles long; some 8,000 feet, beginning at the Berryessa Creek confluence and terminating 1,150 feet north of the future Sinclair Freeway, are to be improved.

The lower reaches of Calera Creek downstream from the future Sinclair Freeway are not adequate to safely convey the design flood water and to prevent damage to existing and anticipated urban developments. Potential urbanization of the watershed (residential, commercial, and industrial developments) will greatly increase the peak runoff. The existing railroad trestles and North Main Street box culvert will cause substantial flow backup at design flow levels, with potential flood damage in the adjacent areas.

After considering various alternatives and economics, a flood improvement project consisting of the following major components has been selected:

1. A confluence structure at Berryessa Creek
2. Box culverts at the crossings of two railroads
3. A trapezoidal open channel and box culvert road crossings in lower reaches and a reinforced concrete channel and a reinforced concrete pipe in upper reaches.

4. A reinforced concrete box culvert overcrossing of the Hetch-Hetchy aquaducts, and an inlet-transition structure and associated bar rack and silt-bed load trap at the upstream end.

Open channels will have strips of lands parallel to the channel for landscaping. Reinforced concrete channels will also receive aesthetic treatment.

Evergreen Creek

Evergreen Creek originates in the foothills east of San Jose and flows generally westward from the foothills across the valley to its outfall into Thompson Creek. A portion of the existing channel of Evergreen Creek in the valley is inadequate to contain major flood flows. In the lowest reaches, there is no channel and the flood-sheet flows across the gentle slopes of the valley. Flooding has occurred in the past, but the damage has been slight as the land use is principally orchards. The watershed is in the City of San Jose, and is zoned for single-family housing. A junior college campus is also planned on the watershed. Development pressure is increasing on the watershed, and potential flood damage to such urban development is great.

Evergreen Creek has a drainage area of about 2 square miles which is fairly even divided between the steep foothills and the level valley floor. In the hills, stream gradients are steep, with the stream eroding the underlying rocks. However, the erosion is slow and the channel appears to be relatively stable and well developed. In the middle portion below the foothills, the channel is still defined and has moderate slopes of 6 percent to 8 percent. In the lower reach, however, the stream loses its identity and merges with nearly level alluvial valley floor.

The proposed flood control improvements to Evergreen Creek will extend over the lower 2,870 feet of the stream channel upstream from the confluence

with Thompson Creek. From the upper end of the improved channel to the foothills (about 9,300 feet), the existing channel has adequate capacity for the design flow. In the upper reaches of the channel, right-of-way will be acquired as the land is developed, and the channel will be maintained in its natural condition. The lower portion of the improvement involves a trapezoidal rock-lined section. At the confluence with Thompson Creek, a grouted rock chute is proposed. A clear span bridge for the San Felipe Road crossing and a new bridge for the Yerba Buena Road crossing will be needed. An upstream sediment control facility may be constructed later on if needed.

Fisher Creek

Fisher Creek drains the western slopes of Pueblo lands and the alluvial valley west of Highway 101 in South San Jose. It drains an area of about 15.5 square miles. The present channel is incapable of handling the district's design flood flow of 3,700 cfs, and flood improvements are planned over a stretch of 37,800 feet of the creek. Many parts of the watershed have low infiltration rates and high water tables. After considering many alternatives for improving the creek and increasing the channel capacity, an excavated trapezoidal channel with a side slope of 4:1 has been selected. In the lower reaches, a low flow channel has also been incorporated to limit the spreading of the more frequent flows. A wide channel bottom is used to minimize erosion, and a relatively flat side slope of 4:1 provides the opportunity for more diversified landscaping and public usage. Only one drop structure is planned at Tilton Avenue, where the project ends. A depressed access road is planned so as to provide efficient creek maintenance, decrease the impact of pedestrian and vehicular traffic on adjacent properties, and provide a planting area that will not interfere with maintenance activities. Certain culverts and bridges across roads and the railroad will have to be modified or reconstructed.

Flint Creek

Flint Creek, in the foothills of the southwesterly slopes of Mt. Hamilton, east of San Jose, descends from an elevation of 2,400 feet at its watershed divide to an elevation of approximately 125 feet at its confluence with Silver Creek. In the hilly areas, the creek flows through deep ravines with steep side slopes at an average gradient of approximately 15 percent. Southwesterly from Mt. Pleasant Road, the stream passes through orchards and row crop areas to an almost level reach between White Road and Silver Creek. The creek has a good cover of surface vegetation. The existing channel is inadequate to convey its normal seasonal flows except in the steeper portion of the creek above Mt. Pleasant Road. The stream overflows the banks and sheet flow spreads out in the orchards and fields between Mt. Pleasant Road and White Road during floods. These roadways are subject to inundation, and the flood hazard is likely to increase with urbanization.

Flint Creek watershed is long and narrow in shape, having a length of approximately 3.5 miles in the east-west direction and a width averaging 0.7 mile; it has an area of about 2.1 square miles. Substantial residential development has already occurred in the lower portion of the watershed, but the steeper upper portions are still only sparsely settled.

Design flood flow is estimated to be 480 cfs. Infiltration capacity of soils is usually higher near the foothills in the alluvial fans compared to the lower reaches of the channel.

During floods, a potential floodplain is created in the area below White Road where there is presently no well defined channel. The most economical and permanent solution for the flood control improvement of Flint Creek is an earth channel section in bottom flat reaches between Silver Creek and White Road, and pipe conduit in the steep upper reaches. Existing culverts at White Road, Flint Road, and Mt. Pleasant Road are

inadequate for the designed 100-year flow and will be replaced to prevent backwater and unnecessary flooding.

Fowler Creek

Fowler Creek, originating from the eastside hills of San Jose at about 2,300 feet elevation, drains approximately 2.78 square miles of watershed up to its confluence with Thompson Creek. Seventy percent of the drainage area lies in the hills. It is anticipated that most of its valley lands will eventually be subdivided into houses, schools, parks, and shopping centers.

Fowler Creek channel is well defined as it flows through the foothills, until it enters the valley floor. As the creek emerges from the foothills, the grade flattens and deposition of sediment causes the flow to spread, resulting in channel obliteration. The channel disappears some 4,000 feet east of Thompson Creek, and the flow either dissipates into orchards or vineyards or sheet flows overland to Thompson Creek during heavy storms. Valley floor areas of the watershed, containing orchards, farm houses, and some residential houses, are subject to flooding presently.

The proposed improvements extend over a length of 12,800 feet. It is planned to construct an open trapezoidal earth channel from San Felipe Road to a point 3,000 feet east and a reinforced concrete pipeline from there to the point where the creek emerges from the foothills. Landscaping is planned on both sides of the open channel, which will have energy dissipator drop structures at intervals to maintain flow velocities below erosive level. Culverts and bridges will be provided at roads and farm crossings. Siphons will be constructed for the existing irrigation canals. Sediment control facilities are proposed in the upstream ends of the project to allow some of the suspended materials to be caught before entering the pipeline. The basin also creates the head necessary for pipeline entrance flow conditions.

Los Coches Creek

Los Coches Creek, a tributary of Berryessa Creek, has a drainage area of 4.08 square miles. This creek, being next to Calera Creek, has many similar physical characteristics. Design flood for the creek is 970 cfs. The valley part of the watershed is on the fringe of growing urban areas, and the natural channel is inadequate to convey the design flood. Flood control improvements are proposed from the downstream end at Berryessa Creek to the upstream end of a sediment control facility, which is about 1,300 feet upstream from Piedmont Road, a total length of 8,000 feet. The proposed project consists of improvements to the existing improved channel and construction of concrete trapezoidal and rectangular sections, and a sediment control facility. In certain reaches, the stream channel is already improved and will not require further work. Provisions are made for road crossings and canal transition structures.

Lower Penitencia Creek

The watershed of Lower Penitencia Creek, above its confluence with Coyote Creek, encompasses about 28 square miles of the northeasterly part of San Jose. The stream gradients are steep in hilly areas, but the gradient breaks sharply when the creek enters the alluvial fan. Design discharge of the creek varies from 300 cfs above the confluence with Penitencia East Channel to 5,000 cfs between Coyote Creek and the confluence with Berryessa Creek.

The existing channel from the confluence with Coyote Creek to Spence Avenue is inadequate to carry the design flood levels. The reach below the confluence with Berryessa Creek will be improved with an unlined trapezoidal section. The section through Nimitz Freeway will be concrete-lined. Upstream from the confluence, the improvement will consist of raising levees, providing flood walls where inadequate right-of-way is available, and earth

trapezoidal channel. Necessary canal transition and other structures will be provided. The total length of improvements on Lower Penitencia Creek will be approximately 3,500 feet.

North Babb Creek

North Babb Creek, draining an area of about 1,700 acrea, extends from the foot of the Mt. Hamilton Range east of San Jose to the confluence with Silver Creek. Portions of the creek have already been developed. The creek carries heavy sediment load during floods from the hillsides. The proposed improvements on the creek will stretch from the confluence with Silver Creek to about 500 feet upstream of Highwood Drive, a length of approximately 700 feet. Above this point, the channel has already been improved to handle the design capacity.

The planned improvement consists of rectangular concrete channel because of the limited right-of-way and existing residential developments. The existing box culvert at Highwood Drive crossing will be improved by removing existing riprap, inadequate channel lining, and warped transitions. The maximum design flow for this channel is estimated to be 300 cfs.

Penitencia Channel East

Penitencia Channel East drains a section of valley floor within the watershed of Lower Penitencia Creek. The watershed is already substantially developed, and the channel needs improvements to handle the design flow. The existing interim channel traverses in an easterly direction, crossing Montague Expressway and continuing easterly, then swinging south to its terminus adjacent to Trimble Road where it connects with the Capitol Avenue storm drain. The channel runs along the railroad, and crosses roads and other utility lines. The proposed improvements will extend over a length of 3,500 feet and will consist of earth channel, drop structures, box culverts, and a pipeline.

Quimby Creek

Quimby Creek originates in the hills east of San Jose, in the general vicinity of Quimby Road, at an elevation of some 2,300 feet. The watershed area is approximately 2.17 square miles; the major part of the tillable land is presently in orchards and farm produce. The hilly portion of the Quimby watershed is moderately sloping, and most of the watershed is expected to be developed. Already some development is creeping up on the watershed.

The channel is well defined in hilly areas, but in the valley, flow takes place through shallow water swales. Moderately infiltrating soils and vegetative growth along the channel have dampening influences on floods. The 100-year design flood flow of 550 cfs cannot be handled by the present channel. The proposed flood improvements will stretch over a length of approximately 10,500 feet, and the project calls for an open trapezoidal earth channel from the Thompson Creek confluence to station 40+00, a concrete pipe, and a sediment control facility. Culverts on road-crossings will be replaced or modified. Drop structures, intake structures, energy dissipators, farm bridges, etc., will be parts of the project. An area on each side of the open channel will be set aside for landscaping.

Ruby Creek

Ruby Creek is bounded on the north by Flint Creek watershed and on the south by Norwood Creek watershed. The upper reaches east of Klein Road in the hills are in steep ravines that collect runoff from a tributary area of about 1.6 square miles which extends up to an elevation of 1,200 feet. The Ruby Creek watershed runs generally east and west and is about 2.6 miles long and 0.8 mile wide.

Residential development in the Ruby Creek watershed has been extremely active between White Road and Mt. Pleasant Road, and 90 percent of the watershed is expected to be developed eventually. Other watershed characteristics of Ruby Creek are very similar to those of Flint Creek. The present flow path of the creek cannot handle the design flow of 250 cfs. Improvements over a length of approximately 9,120 feet are proposed. The most economical alternative, and the one selected for this project, is an earth channel section from Silver Creek to White Road and a pipe conduit within the Tully Road right-of-way through the upper reaches until it intercepts the existing creek channel east of Ruby Avenue. The improvement will include modification of crossings, various canal structures, and a sediment control facility. A strip on each side of the open channel will be reserved for landscaping.

Lower Silver Creek

Silver Creek is one of the major tributaries of Coyote Creek. It originates in the low foothills southeast of San Jose in the general vicinity of Metcalf Road at about 1,200 feet elevation. It drains a watershed of 42.2 square miles (total) in a north-northwesterly direction until it meets Coyote Creek near Bayshore Freeway. Portions of the watershed are unincorporated (county) lands. The watershed is rapidly developing, and channel capacity needs to be increased to handle the design flow of 4,300 cfs. Some 35,800 feet of channel in the lower reaches of Silver Creek are proposed to be improved. The proposal calls for concrete-lined trapezoidal channels, improvements to existing concrete-lined channels, earth channel, rock-lined channel, box culverts at various street locations, and reinforced concrete pipe. Landscaping and other environmental amenities will be provided to minimize adverse aesthetic impacts.

South Babb Creek

South Babb Creek originates at the foot of the Mt. Hamilton Range in the southeasterly portion of the City of San Jose. Its watershed covers

an area of 2,520 acres, most of which is unincorporated land, part of the County of Santa Clara. The design discharge varies from about 600 cfs at the confluence with Silver Creek to about 400 cfs above Clayton Road. The proposed length of improvements is about 9,000 feet, extending from the confluence with Silver Creek to about 4,000 feet upstream of Clayton Road. The remainder of the creek lies in well-defined ravines in steep hills and needs no flood improvement.

The valley portion of the watershed has intense residential development with limited rights-of-way. To handle the design flow and safeguard against prohibitive flood damage, the flood improvements will consist chiefly of vertical walled channel interspersed with box culverts, except in the uppermost reaches where a modified floodplain with levees on both sides will be constructed. Sediment control facilities will be provided in the future if necessary.

Thompson Creek

Thompson Creek, the major tributary of Silver Creek, originates in the neighborhood of the Silver Creek headwaters. Portions of the watershed are still agricultural, but development pressure is great. The present channel needs improvements to handle the design flows, which vary from 660 cfs to 3,350 cfs over the improvement length of approximately 8.58 miles. The project begins at the confluence with Silver Creek near the Eastridge Shopping Center and terminates 6,700 feet upstream of the intersection of Silver Creek Road with San Felipe Road.

Major portions of the channel are already partially improved or are adequate in their natural condition. Some features of the project consist of the improvement of existing channels and the use of a modified floodplain with levees on both sides. Necessary canal structures and road crossings will be provided. Landscaping and environmental considerations are parts of the project. At places, the creek has steep banks in upper reaches, and some

gabion lining will be done where necessary to stabilize the sides. Improvements will also include removal of certain homes from areas that appear unsafe from flooding and/or erosion.

Upper Penitencia Creek

Upper Penitencia Creek, another major tributary of Coyote Creek, originates in foothills east of San Jose. It has a drainage area of about 24 square miles, and the valley portion of the watershed is already partially developed. Its maximum 100-year design flow is 5,600 cfs.

Upper Penitencia Creek has been divided into 26 reaches for the purpose of describing the flood improvements over an approximate length of 3.75 miles from the lower terminus at Coyote Creek to the upper terminus 200 feet upstream of Dorel Drive. Flood control measures include trapezoidal earth channels, modified floodplain, concrete channel, and natural channel. Many road-crossing bridges and culverts will be modified or replaced. Canal structures, such as drops with energy dissipators, will be provided. Landscaping will be part of the project, as the City of San Jose wishes to incorporate Upper Penitencia Creek into its park chain. The concrete channel will be suitably treated with color and design patterns to make it aesthetically pleasing.

Yerba Buena Creek

Yerba Buena Creek, with a drainage area of approximately 2.15 square miles and a length of about 1.52 miles, is a tributary of Thompson Creek. This creek is one of the most heavily vegetated and scenic channels in the Evergreen area, and the City of San Jose has included Yerba Buena Creek in its park chain plan. This feature of the creek has been considered in the design of the channel.

The lower reach of the channel will be left in its natural state except for construction of access roads with proper environmental considera-

tions. In a short middle reach, reinforced concrete pipe buried underground is considered to be the best alternative. The upper reach of the channel will be left in the natural state. Debris racks, an impact type of energy dissipator, and similar devices will be provided in the middle reach. An existing earth dam in the lower reach of the channel is of inadequate capacity and will be removed. The 100-year design flood discharge for the creek varies from 520 cfs upstream to 660 cfs in the downstream end.

D. Authorization

The construction of the proposed project has not been authorized by the District's Board of Directors. Specific authorization must be obtained for each part of the project based upon final design and cost estimates. At that time supplemental Environmental Impact Statements will be submitted for review and acceptance.

At its meeting of May 8, 1973, the District's Board of Directors authorized the District staff to proceed with the selection of a consultant to prepare an Environmental Impact Report (EIR) for the East Zone flood control projects. The consultant was selected and funds were authorized for the EIR at the District's June 25, 1973 meeting.

Section III

EXISTING ENVIRONMENTAL SETTING

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III EXISTING ENVIRONMENTAL SETTING

A. Local and Regional General Description

The region in which the project is located encompasses the northern Santa Clara County-southern San Francisco Bay area. Situated for the most part in what is at times referred to as the "San Jose Plain," the project area extends easterly to the foothills of the Diablo Range (also known locally as the Hamilton Range), southerly to Lake Anderson Dam near the city of Morgan Hill, westward to the western edge of the Coyote River floodplain, and north to San Francisco Bay (see Figure II-1). The majority of this area has undergone urban development and includes portions of the cities of Milpitas and San Jose.

Two major streams -- the Guadalupe River and the Coyote River -- flow across the San Jose Plain into San Francisco Bay. As indicated in Exhibit B, it is the Coyote River (often called Coyote Creek) and its tributaries which constitute the watershed of concern for this project. Coyote Creek begins at Lake Anderson Dam and flows northward through rural and agricultural lands, through the cities of San Jose and Milpitas, and eventually through the South Bay marshlands to San Francisco Bay. Tributary to Coyote at its southern end is Fisher Creek which flows through agricultural lands to its confluence with Coyote Creek at the Coyote Narrows near Tulare Hill. Eight creeks flowing from the foothills of the Evergreen Area are tributary to Silver Creek, which flows north out of the Evergreen Area and then westerly to its confluence with Coyote Creek. Upper Penitencia Creek has its origins high in the foothills at Cherry Flat Reservoir; it flows through Alum Rock Park and then westerly to its confluence with Coyote Creek. The remaining major tributary

system consists of the Calera, Los Coches, Berryessa, and Lower Penitencia Creeks near and in the city of Milpitas. Calera and Los Coches Creeks flow westerly from the foothills, then join Berryessa Creek on its northerly journey to join Lower Penitencia, which joins Coyote Creek near the Santa Clara-Alameda County border.

B. Physical Setting

Topography

The Santa Clara Valley is a large structural feature separating the central coast ranges into eastern and western divisions. It is about 100 miles long and about 15 miles wide at its northern end, where it is flooded by waters of the Southern San Francisco Bay. The valley is bounded on both sides by rolling hills and mountainous uplands. The western uplands include the Santa Cruz Mountains, a complex of steep, rugged ridges, ranging in elevation up to almost 4,000 feet. The eastern uplands comprise the Diablo Range, which separates the Santa Clara Valley from the inland San Joaquin Valley. Ridges trend northwesterly and are less rugged than their western counterparts, although slightly higher (Copernicus Peak is 4,372 feet).

The lowlands consist mostly of coalescing fans and floodplain deposits. The floor of the valley ranges up to 400 feet in elevation. Drainage from both mountain ranges empties into the valley and eventually drains (primarily) into San Francisco Bay. At Morgan Hill the alluvial fan of Coyote Creek, as it emerges on the valley floor, forms a drainage divide. Runoff flowing south of Morgan Hill flows south to Monterey Bay.

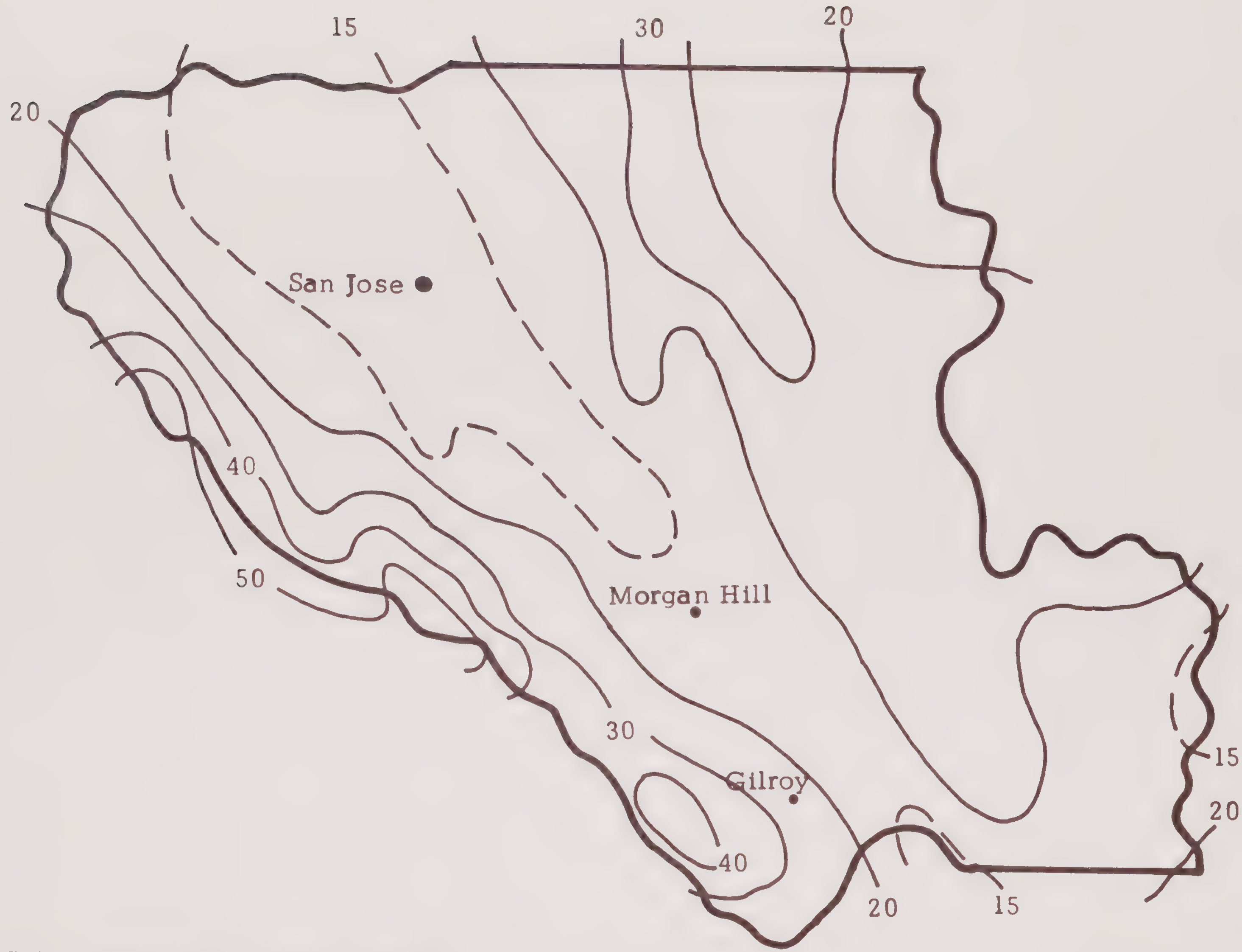
The valley lies within the paths of storms which periodically sweep inland from the Pacific Ocean during the winter months. As expected, higher rainfall readings are taken in the mountain ranges bordering the valley. In the Diablo Range, the headwaters of Coyote Creek tributaries, mean annual precipitation ranges up to 24 inches, but along Coyote Creek near San Jose and San Francisco Bay, the mean annual rainfall is only about 14 inches.

Below Lake Anderson along the Coyote Narrows, mean annual precipitation varies from 16 to 20 inches. Almost all of the measurable precipitation occurs during the months of October through April. The region is classified as semiarid and the climate is moderate. Most of the precipitation, even on the hills, falls as rainfall. An isohyetal (rainfall) map of the valley is presented as Figure III-1.

Evaporation in the valley averages over 60 inches per year on open bodies of water. However, evapotranspiration potential will have negligible influence on the project, because no reservoirs are planned except small debris basins.

Slopes along the relatively flat valley floor range from less than 1 percent along certain portions of Coyote Creek and near San Francisco Bay to 6- to 8-percent slopes in foothills. The elevations in the portion of basin to be developed range from sea level at the bay to 2,400 feet in the hills east of San Jose. Tributaries draining to Coyote Creek from the eastern foothills have slopes exceeding 20 percent, but their gradients are sharply reduced to 6 to 8 percent as they enter the valley floor through the alluvial aprons. Because flood danger exists only on the valley floor, flood improvements on tributaries usually start at the toe of the foothills at the apex of the alluvial aprons; elevations at these points vary between 500 to 600 feet above sea level. The elevation along Coyote Creek from the downstream end of Anderson Reservoir to the outfall ranges from 400 feet to 0. Fisher Creek, lying west of Coyote Creek, has relatively flat terrain, ranging from about 350 feet to about 250 feet in elevation along the channel.

Silver and Thompson Creeks originate from low hills on the southeast side of San Jose at about 1,200-foot elevation, and flow in a north-northwesterly direction toward the Coyote confluence. The general direction of flow for Fisher and Coyote Creeks is northerly, while remaining



Source: Soil Conservation Service 1968

FIGURE III-1 ISOHYETAL MAP

tributaries to Coyote generally flow in westerly directions. Low hills west of Fisher Creek have peaks as high as 1,000 feet.

General and Structural Geology

The Santa Clara Valley is a large structural depression which has been the site of various periods of alluvial and estuarine sedimentary deposition. Detailed geologic descriptions may be found in References 2, 3, 7, 8, 9, 10, 17, and 26.*

The gravels, sands, silts, and clays associated with these sequences range in thickness to over 1,000 feet in the area just north of San Jose. The more recent sediments are generally divided into two units, younger and older alluvium. The younger alluvium represents fluvial and interfluvial basin deposits of Holocene to recent age. Below these sediments are the Pleistocene fan deposits of the older alluvium. Stratigraphically underlying the younger and older alluvium is the Santa Clara formation of Plio-Pleistocene Age. Its semiconsolidated sediments include conglomerates, sandstone, siltstone, and claystone. The coarser-grained sediments are poorly sorted and have a fine-grained matrix; thus the formation generally has low permeability and small groundwater yield along the edges of the valley and low foothills where they outcrop. These sediments provide the major groundwater reservoir for the Santa Clara Valley. Exhibit C depicts the near-surface distribution of these younger sediments in the project area as mapped by Helley and Brabb (1971).

Bedrock in the area consists primarily of Jurassic-Cretaceous rocks of the Franciscan-Knoxville group with some Cretaceous sedimentary rocks and tertiary sequences. The distribution of outcrops of these and the younger units is shown in the general geologic map of the area, Exhibit D.

Structural relationships are generally complex. The valley itself is a down-dropped block bounded on either side by faults. As with most

*For numbered references, see list at end of this section (B).

of Central California, structural trends in the area are generally northwesterly. Folding and fault-related deformation is common in the older rocks. Major active faults in the area include the San Andreas, Hayward, and Calaveras faults. Also within the area, but of uncertain activity, are the Sargent, Silver Creek, and Madrone faults, as well as others. The major faults in the area are essentially strike-slip with right-lateral displacement.

Soils

Soils in the East Zone of the District consist of a number of associations of tidal and alluvial materials, most of which are suitable for agricultural use. Detailed descriptions of associations and specific soils can be found in the "Soils of Santa Clara Valley," by the U.S. Soil Conservation Service (1968), and will not be repeated here.

A series of detailed soils maps for the project area is presented in Appendix A. Potential erodibility is shown on these maps. As indicated, little of the project site appears to have high erosion potential. Highly eroded areas are generally in the uplands, and supply sediment to the valley floodplains. Also indicated on these maps are the areas of high surface water infiltration. These areas represent the primary regions of recharge of the confined aquifer. They lie mainly along the valley margins and upper portions of stream channels. Other soils exhibit poor to fair infiltration characteristics.

Tables presented in Appendix A describe relevant physical, chemical, and engineering characteristics of the soils. Individual channels should be referenced to these tables through the appropriate soils map.

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Groundwater

The Santa Clara Valley groundwater system is composed of three interconnected subbasins. The largest and most important with regard to local water supply is the northern, or Santa Clara Valley, groundwater basin. The central and southern groundwater basins are the Coyote and Llagas basins, respectively; they are located south of the Coyote Narrows.

The groundwater regime in the project area is composed of pervious sand and gravel interlaced with impervious clayey layers, and is typical of conditions throughout the basin. These impervious layers effectively divide the basin into a dual system of confined and unconfined aquifers. Aquifers below such layers are exposed, and are recharged along the valley margins. These recharge zones are collectively known as the "forebay." The central, or pressure, area is composed of extensive clay layers underlain by water-bearing sediments having a combined thickness of up to several thousand feet.

Along the edges of the foothills and downstream of the Coyote Narrows, pervious areas (forebays) exist through which groundwater recharge takes place. The groundwater table is high and usually stays high in Coyote Narrows, while it is highly variable through the remainder of the basin. The average seasonal subsurface inflow from the adjacent hills into the Santa Clara Valley groundwater basin is about 13,000 acre-feet. In addition, the average seasonal subsurface inflow from the Coyote groundwater basin is approximately 9,300 acre-feet. Subsurface outflow from the basin is indeterminate. Heavy extraction of water produced an accumulated overdraft of about 685,000 acre-feet up to 1967. Improved water management techniques have been reducing the rate of overdraft in recent years.

Groundwater basins are recharged through a variety of natural and artificial mechanisms. Infiltration of rainfall on the valley floor and

runoff from tributary creeks provide the primary supply. To improve aquifer recharge, a number of percolation ponds have been constructed. Dams and reservoirs constructed for flood control purposes retain runoff that would otherwise be lost to the bay. The current groundwater management program appears to be effectively controlling the historical overdraft problem.

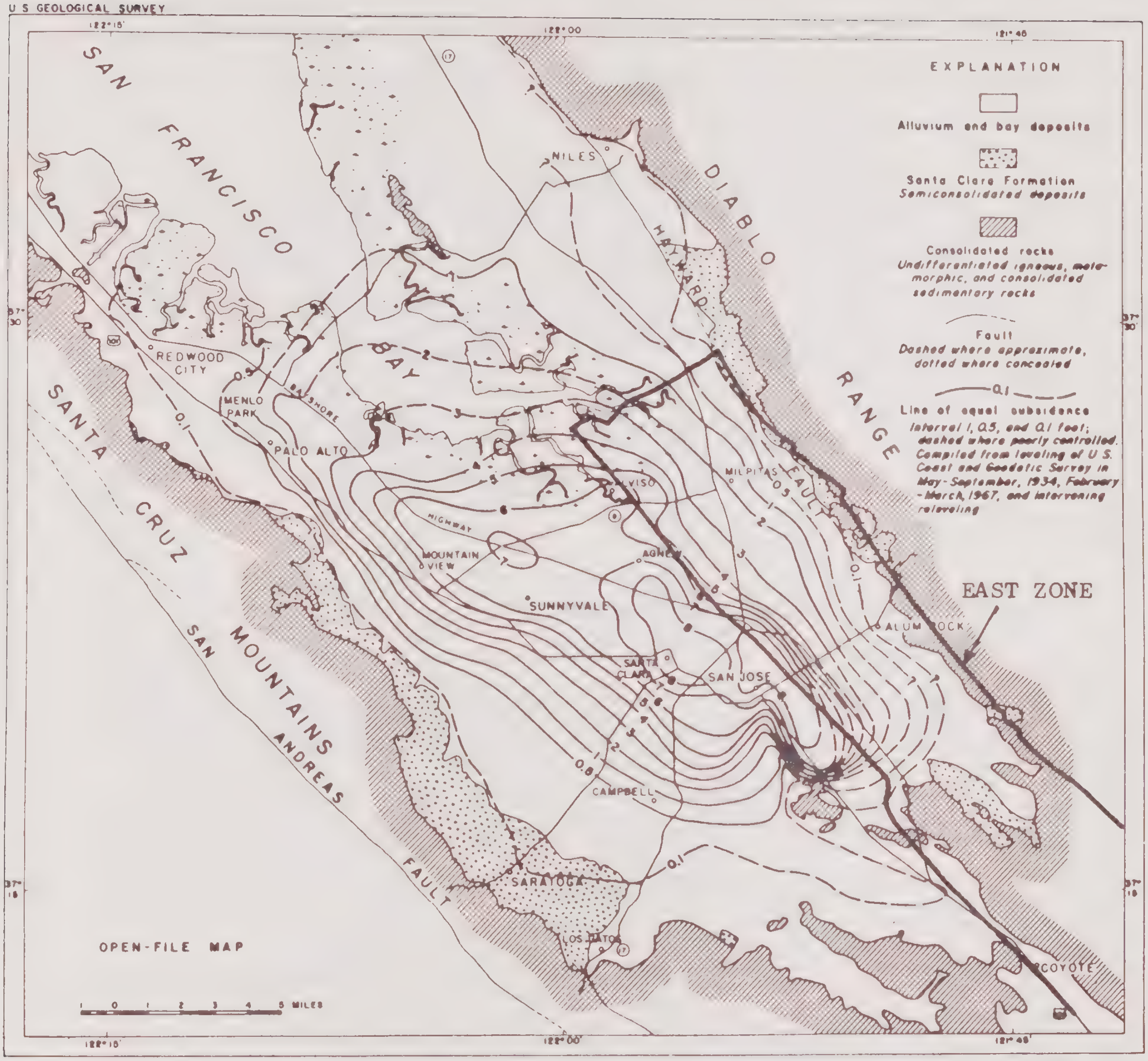
Subsidence

Overdrafting of water from the aquifer system in the Santa Clara Valley Water Basin for the past 60 years or more has resulted in local land subsidence totaling over 12 feet. This subsidence has created many problems that have cost local water-related agencies millions of dollars, including well-casing failures, the raising of dikes and levees along flood-potential streams, and the repair or loss of capacity (hydraulic efficiency) of once adequate storm and sewage drain systems.

The phenomenon of subsidence as it occurs in Santa Clara County results from a reduction in the upward supporting pressures within the aquifers. The primary supporting pressures are the artesian fluid, or pore, pressure and the effective intergranular pressure, both of which are reduced directly by pumping of the groundwater reservoir. As these pressures decline, the overburden or geostatic load causes compaction of the aquifer's structural skeleton and leads to subsidence.

The degree of subsidence is related to the amount of the pressure reduction, the magnitude of the overlying load carried by the aquifer, and the size and type of material that make up the aquifer. If a good portion of the material is fine-grained, then the reduction of interstices will be greater. Land subsidence from 1934 to 1967 in the Santa Clara Valley is shown in Figure III-2 (Ref. 6).

The thickness of the alluvial fill in the Santa Clara Valley is as much as 1,500 feet. The first 500 feet of the fill consist primarily of clay in the central part of the basin, and sand and gravel in the perimeter areas at higher elevations. The central part of the fill is said to contain about half clay and half gravel between 500 and 1,000 feet. The major part of the aquifer system is confined at a depth of 200 feet by a clay layer. Perched water exists within the upper part



SOURCE: California Division of Mines, 1969, S.R. 97

FIGURE III-2 LAND SUBSIDENCE, 1934-1967 SANTA CLARA VALLEY, CALIFORNIA

of the clay layer, which is considered to contain a less desirable quality of water. Clay beds are local and discontinuous around the valley perimeter where most of the recharge takes place. The transmissivity of the central part of the groundwater basin below 200 feet is considered poorer than at shallow depths. This is due to the fine-grained material in it, which slows the recharge process.

In 1915, the artesian head of the confined aquifer was at ground surface in the area adjacent to San Francisco Bay. By 1965 it had dropped to 150 to 200 feet below the ground surface. This drop was caused by increasing drafts -- 40,000 acre-feet per year in 1915, increasing to 180,000 acre-feet per year in the 1960's. Originally, 90 percent of the draft was for agricultural use; this use has been reduced to about 18 percent in recent years. The rest of the draft has been used for industrial and municipal purposes.

Figure III-3 shows the average annual precipitation for the City of San Jose from 1908 to 1970. It also shows the depth to water at the end of the irrigation period, the subsidence due to the overdraft, and the rate of population growth in the basin area. The depth to water curve shows a significant recovery in the period from 1935 to 1943, a period of above-normal precipitation. In addition, in 1935 several reservoirs were constructed for groundwater recharge, including Almaden, Calera, Coyote, Guadalupe, and Stevens Creek. It is important to note that subsidence nearly ceased during this time. For this reason the groundwater table level that existed in 1942 is considered by the District to be the desirable level in this basin in terms of its recharge program.

As shown by the depth to water curve in Figure III-3, the confined aquifer system, which is over 173,000 acres in area, is not capable of supplying the water demand from its recharge and must draw on its permanent storage. This is an undesirable condition since subsidence will occur with compression of the aquifer.

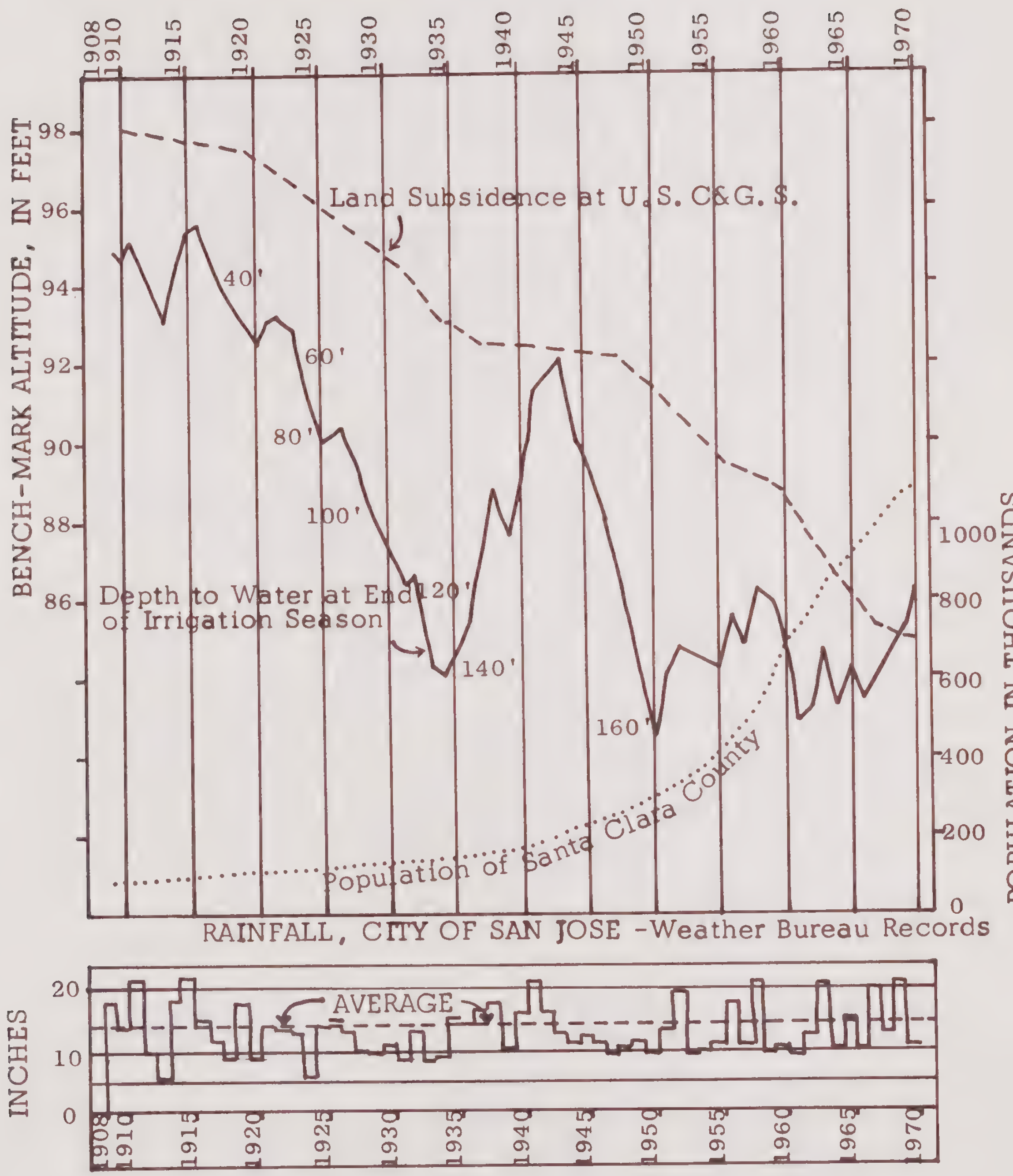


FIGURE III-3 RAINFALL, AVERAGE DEPTH TO WATER, LAND SUBSIDENCE, POPULATION: SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

In the 1930's detention reservoirs were built to capture water which would normally be lost to San Francisco Bay as stream runoff. Percolation ponds were constructed in the permeable surface aquifer areas to receive controlled releases from the reservoirs. This enabled continual recharge of the confined aquifer system.

In recent years this additional recharge has not been enough to meet the demand, so water has been imported from the Hetch Hetchy Aqueduct and the State South Bay Aqueduct to recharge the confined aquifer system. Since the aquifer system consists mainly of fine-grained material, its transmissivity is low and recharge of the aquifer is slow. To prevent the water level from dropping significantly, some of the imported water is treated and then distributed to local water retail agencies. This allows a safe yield from the aquifer to be maintained without excessive draw-down.

The difference between the total supply and total disposal of the water in the basin reflects a seasonal deficit (overdraft) or surplus. Table III-1 summarizes the average seasonal water supply and water disposal for the 1965-1966 and 1967-1968 water years. The accumulated overdraft (the amount of water removed since 1942) is also shown for these two water years. The surplus indicated for the 1967-1968 water year was the result of the water imports. As shown in Figure III-3, subsidence decreased as a result of this surplus. Although subsidence had nearly stopped in 1970, it ranged from 0.08 to 0.55 feet per year since 1960. Thus an area of 100 square miles within the basin subsided 1 foot between 1960 and 1970.

It is said that compaction or subsidence occurs mostly in the fine-grained material and that restored groundwater levels will not cause the land surface to regain its former elevation, as the compacted sediments cannot be expanded.

Table III-1

ANNUAL WATER SUPPLY AND WATER DISPOSAL
IN THE SANTA CLARA VALLEY GROUNDWATER BASIN
(Acre-Feet)

	1965-1966	1967-1968
Water Supply		
Precipitation	160,000	179,000
Stream and Surface Inflow	96,000	108,000
Subsurface Inflow	43,000	56,000
Import	48,000	86,000
Subtotal	347,000	429,000
Water Disposal		
Consumptive Use	288,000	279,000
Stream Outflow	23,000	30,000
Subsurface Outflow	- -	- -
Export (sewage)	90,000	103,000
Subtotal	401,000	412,000
Water Supply Minus Water Disposal		
Surplus (+) or Deficiency (-)	-54,000	+17,000
Accumulated Overdraft since 1942	760,000	678,000

Source: Santa Clara County Flood Control and Water District.

As indicated, subsidence has virtually stopped as a result of the Santa Clara County Flood Control and Water District's recharge program. It might commence again, however, if the amount of water needed for recharge is not available, recharge capacity is modified, or if pumping rates are not kept to a safe level to prevent large drawdowns.

Surface Hydrology

The East Zone of the District lies between the Diablo Range to the east, an alluvial divide on the south, the Guadalupe River Basin to the west, and San Francisco Bay to the north, and is drained to San Francisco Bay by the 75-mile-long Coyote Creek and its tributaries. The Coyote basin has an area of about 420 square miles; 196 square miles of this are tributary to the water supply reservoirs, Coyote and Anderson. The basin has 32 major streams (including Coyote Creek); 13 of these either have been improved to guard against the intermediate regional floods or arrangements have been made for their improvements.

The remaining streams, comprising approximately 120 miles of channel, are almost all to varying degrees inadequate to contain the design floods. The region covered by the streams stretches from north of Milpitas to north of Morgan Hill, and is spread over approximately 155 square miles. Portions of the area along Coyote Creek, Silver Creek, and other streams are already urbanized. Other parts of the basin are semirural and agricultural. Parts of the region have not yet been incorporated in the City of San Jose, but the entire area (except perhaps the extremely steep foothills) is supposed to be favorable for urban growth. Sporadic development is already taking place, and the pressure is mounting for immediate flood improvements by developers who hold some of the undeveloped lands in the area. In some places the potential already exists for overflow and flooding of existing developments, with an attendant hazard to human life and property. Further encroachments over the floodplain by developers will increase the flood damage potential. The need for immediate flood improvements cannot be overemphasized in view of the present policy of developing this region to meet the demands of fast-growing San Jose and its vicinity. Exhibit A shows the areas subject to flooding in the East Zone.

The parts of the area that are planned for improvement have already been modified to varying degrees. The District has developed a comprehensive and coordinated plan of flood improvements for the entire lower Coyote Creek Basin. During the design of these improvements, utmost care has been given to environmental aspects of the project. According to District policy, systematic straightening and concrete lining of channels are not considered appropriate. Instead, a variety of other methods of channelization (i.e., preserving channels in their natural state, lining with rock, or limiting flooded areas by construction of levees on one or both sides of a channel) is considered for each project. In keeping with this policy, structural measures are only employed where existing development has restricted the available right-of-way. In areas where development has not yet occurred and where the character of the existing stream channel warrants, a modified floodplain is planned.

The District has used the 100-year flood criterion for the design of channel capacities. The largest flood since the construction of Coyote and Anderson Reservoirs occurred on Coyote Creek in 1958. The 100-year design flood is approximately twice the size of the 1958 flood; this figure is considered adequate for flood control improvement purposes. An 80-percent confidence limit for the 100-year flow is used for the computation of the freeboard level. Flows corresponding to this limit are approximately equal to the "Standard Project Flood," which is a rare event. Fifty-year flows have been employed by the district for the design of sediment control facilities.

Since 1874, precipitation records have been kept for the valley. Presently many recording and nonrecording gages are in operation. Stream gages are not in place for each creek to be improved, but design flows have been computed from regional analyses and statistical analysis of streamflow records. Many stream gages are maintained along Coyote Creek by the U.S.G.S. and the District. Stream gages are also operating on Penitencia, Fisher, Silver, and Berryessa Creeks, as well as others.

Where earth and concrete channels are unavoidable, provisions have been made to reserve a strip of land for landscaping on both sides of the channel. As much as possible, natural vegetation and trees along the improvements will not be disturbed. Trees and bushes will be planted around structures such as drops and canal transitions to minimize the visual impact. Access roads have also been located in keeping with aesthetic considerations.

For small tributaries where the design flow is not excessive, reinforced concrete pipe is to be used for reasons of economics. Many tributaries (Quimby and others) do not have well-defined channels, and their design flows can be conveniently conveyed in pipes. Debris basins are provided at the upper stream end of the pipes and at other suitable points along pipes or channels to minimize the nuisance due to sediments. There will be manholes at intervals along the pipes, to facilitate inspection and cleaning. Attempts have been made to preserve natural channels, to improve existing channels by cleaning and removing obstructions, and to use the modified floodplain where the region is undeveloped or agricultural and where sufficient right-of-way is available. In developed areas, earth and concrete channels will provide the designed flood protection. In the design of these improvements, the District has considered many alternatives to arrive at an economical and ecologically feasible solution.

To the east of Coyote Creek there are three main tributaries in the project area -- Silver, Upper Penitencia, and Berryessa creeks. Fisher Creek is the only main tributary which lies on the west of Coyote Creek. All other creeks are small. Table III-2 lists all the creeks, with certain relevant data on each. Exhibit B shows the creeks and the types of improvements planned.

Table III-2

EAST ZONE FLOOD CONTROL PROJECTS

Creeks	Drainage Area (sq. mi.)	Length of Improvements (ft)	100-Year Flow (cfs) Design	100-Year Flow (cfs) 80% Conf. Level	50-Year Flow (cfs)	Type of Improvement[a]	Remarks
Coyote Creek	354	185,350	24,000	--	--	MFP, EC, NC	Main Channel (158 sq mi. to be improved)
Berryessa	17.29	30,500	4,100	--	2,820	EC, PCB, MFP, CC, NC	Penitencia Trib.
Calera	2.98	8,000	750	1,300	530	EC, CC, PCB	Berryessa Trib.
Evergreen	1.98	12,200	500	720	410	RGC, NC	Thompson Trib.
Fisher	15.50	37,800	3,700	5,500	3,000	EC	Coyote Trib.
Flint	1.98	7,240	480	840	330	EC, PCB	Silver Trib.
Fowler	2.78	3,010	660	1,150	465	PCB, EC	Thompson Trib.
Los Coches	4.08	8,000	970	--	660	EC, CC, NC	Berryessa Trib.
Lower Penitencia	28.40 (incl. Pen. East Ch.)	3,492	5,000	7,850	3,400	EC	Coyote Trib.
North Babb	2.64	1,482	300	--	--	CC	Silver Trib.
Penitencia East	See Lower Pen.	3,580	--	--	--	EC	Lower Penitencia Trib.
Quimby	2.17	10,000	530	800	275	EC, PCB	Thompson Trib.
Ruby	1.55	8,350	250	450	175	EC, PCB	Silver Trib.
Lower Silver	42.2 (Total)	29,700 (Mostly Improved)	4,300	7,700	3,000	CC, PCB, RCP (Existing)	Coyote Trib.
South Babb	3.94	8,950	1,040	--	--	CC, MFP	Silver Trib.
Thompson	17.45	45,300	3,350	5,900	--	CI, levees	Silver Trib.
Upper Penitencia	21.87	19,800	5,600	9,400	4,400	CC, MFP, RGC, NC	Coyote Trib.
Yerba Buena	2.15	8,000	660	--	450	CI, RCP	Thompson Trib.

a. MFP - modified floodplain; EC - earth channel; NC - natural channel; CC - concrete channel; RCP - reinforced concrete pipe; PCB - pipe or concrete box; CI - channel imp.; RGC - rock or gabion-lined channel

As mentioned earlier, hilly areas have low infiltration rates, but the valley floor has generally moderate infiltration rates. Creek sides and hills usually have good vegetative growths except in the regions subject to active scouring. Along Coyote Creek in the narrows, there are many percolation ponds because infiltration rates in that area are significantly high. Infiltration capacity and vegetative growth combined have a marked influence on the total volume and peak surface runoff. Runoff is usually higher from hilly areas due to low infiltration rates and steep slopes. Vegetative growths in the channel have a dampening effect on the flow rate. Runoff from the valley floor is usually lower because of the flatter slopes and higher infiltration rates.

Creeks usually are well defined and have deep cross-sections in hilly areas. They flatten and become shallower in the valley. Many small tributaries eventually disappear and lose their identities on the flatter valley slopes. Water spreads out into orchards, vineyards, and other agricultural lands, where it irrigates fields, filters into the ground, and evaporates. Only in heavy floods are sheet flows likely to reach the bigger creeks.

In upper watersheds of the tributaries, surficial soils generally consist of clay and fine sandy and clayey silt overlying soft shale and sandstone bedrock. Steeply sloping creeks erode away substantial loads of sediments and detritus materials to the alluvial fans. Sediment loads clog drainage pipes, spread sediments over farmlands, and pose sedimentation problems to the Coyote Creek and other main channels. Flood improvement projects include many sediment control facilities, and provisions have been made for the maintenance of these facilities.

Sediment Transport and Shoaling in South San Francisco Bay

The ultimate fate of material eroded from the East Zone watershed is sedimentation in the San Francisco Bay system. High sediment loads to the bay contribute significantly to the shoaling processes and to high maintenance-dredging requirements.

Although the entire South San Francisco Bay is believed to undergo sedimentation from suspended material transported by Coyote Creek, primary effects are realized south of the Dumbarton Bridge and particularly in that portion of lower Coyote Creek where fresh and saline waters mix. Accelerated sedimentation in the more quiescent portions of this area is due to the increased effective size of the transported material (flocculation of colloidal particles) associated with the salinity increase and the resulting increase in effective particle size. The flocculation process occurs with salinity increases of as low as several parts per thousand. In response to local stream flow, tides, and other fresh water inputs to the bay system, the extent of the flocculation zone varies geographically. Relatively little investigation of such parameters has been conducted in the lower reaches of the bay.

Maximum encroachment of saline waters should occur during high tide and low stream discharge. During a tide of maximum computed height of 9.0 feet at the entrance to Alviso Slough, conductivity and salinity measurements were conducted along Coyote Creek. A measurable salinity increase was observed slightly south (upstream) of the Milpitas sewage treatment facility. Based on salinity measurements and the coinciding distribution of intertidal plants, it is believed this section of the creek is the limit of normal saltwater penetration. It is anticipated that during periods of high system discharge this zone will migrate bayward considerably.

Much of the material flocculated will be transported northward to other shoal areas through the mechanisms of tidal and river currents and

wind resuspension and transport. Figure III-4 indicates shoaling areas in the south bay that are susceptible to inflow of sediments from Coyote Creek.* It was observed, during the field work that considerable sedimentation had occurred in the primary zone of flocculation (mixing) since the most recent update of the local U.S.G.S. chart #5531. Accumulation of up to 5 feet of sediments was noticed in some channel areas. The surficial layers of this sedimentation were observed as a thick "suspension" of flocculated material rather than representing substantial deposition. High flow rates during winter and spring are anticipated to remove much of this material and redeposit it in shoal areas to the north.

Figure III-5 represents a compilation of data from three surveys in 1850, 1940, and 1950. The figure indicates the cumulative sediment volume change. As is clearly shown, the main channel areas were maintaining or eroding in the 1940-1950 period, while accumulation in shoal areas increased. The general slowing of accumulation rates in shoals in recent years is noteworthy. These phenomena probably reflect several major changes in the area. These changes include the accelerating shift in land use from agriculture to urban (with a reduction in sediment generation), the associated changes in alteration of local hydraulic characteristics (increased flow, etc.), better watershed conservation practices, and general subsidence of the area, particularly in the extreme southerly portions.

During high rates of flow from local watersheds and the Sacramento and San Joaquin rivers, the zone of flocculation can be expected to range over a wider area. Higher flow rates and lower bay salinities will push the fresh water/salt water interface bayward. Suspended sediments and bedloads will also be higher during this period. Increasing the zone of influence northward will expose more navigable waterways to accelerated shoaling.

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*Using an Interocean Systems induction salinometer system.

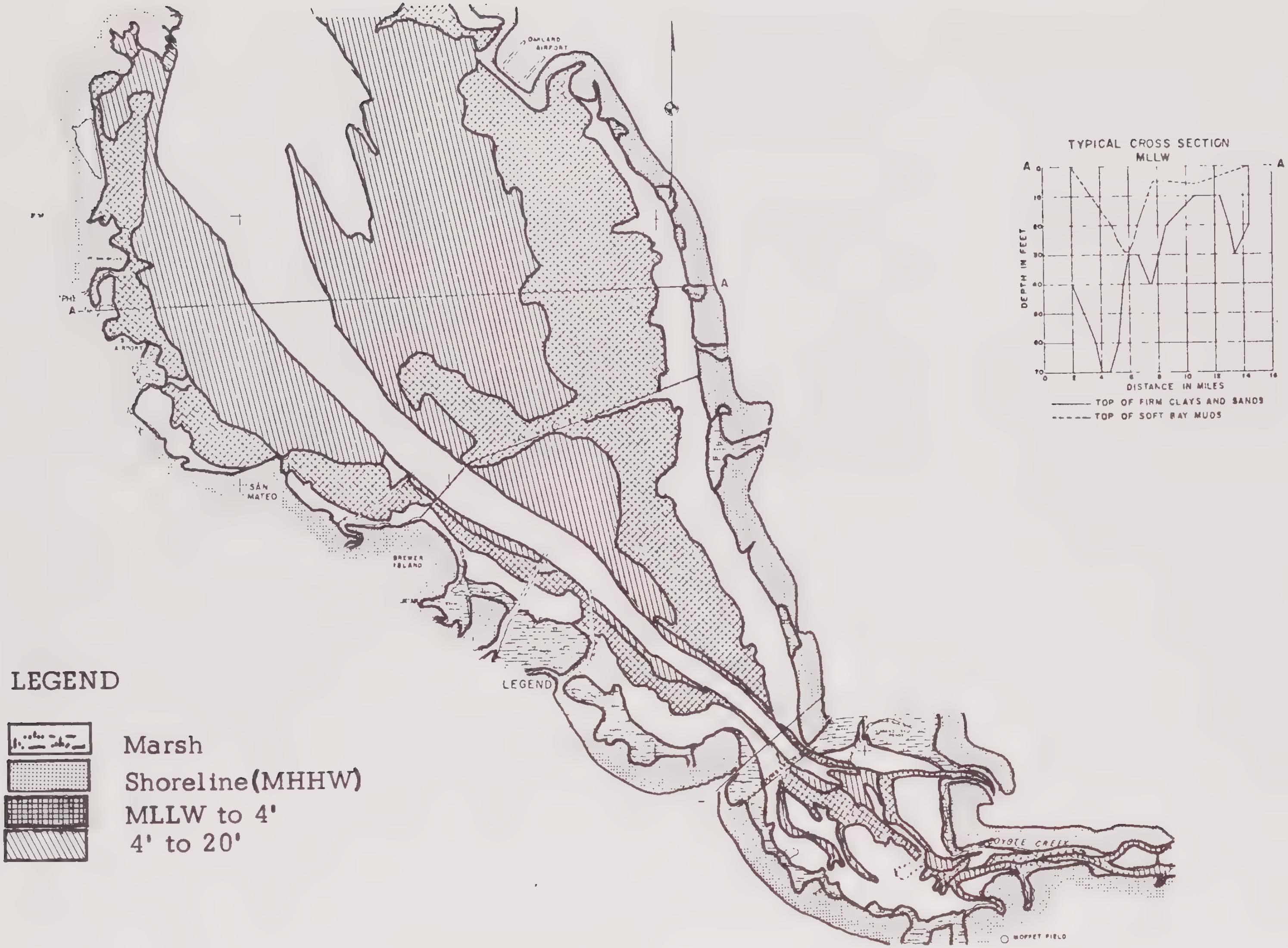
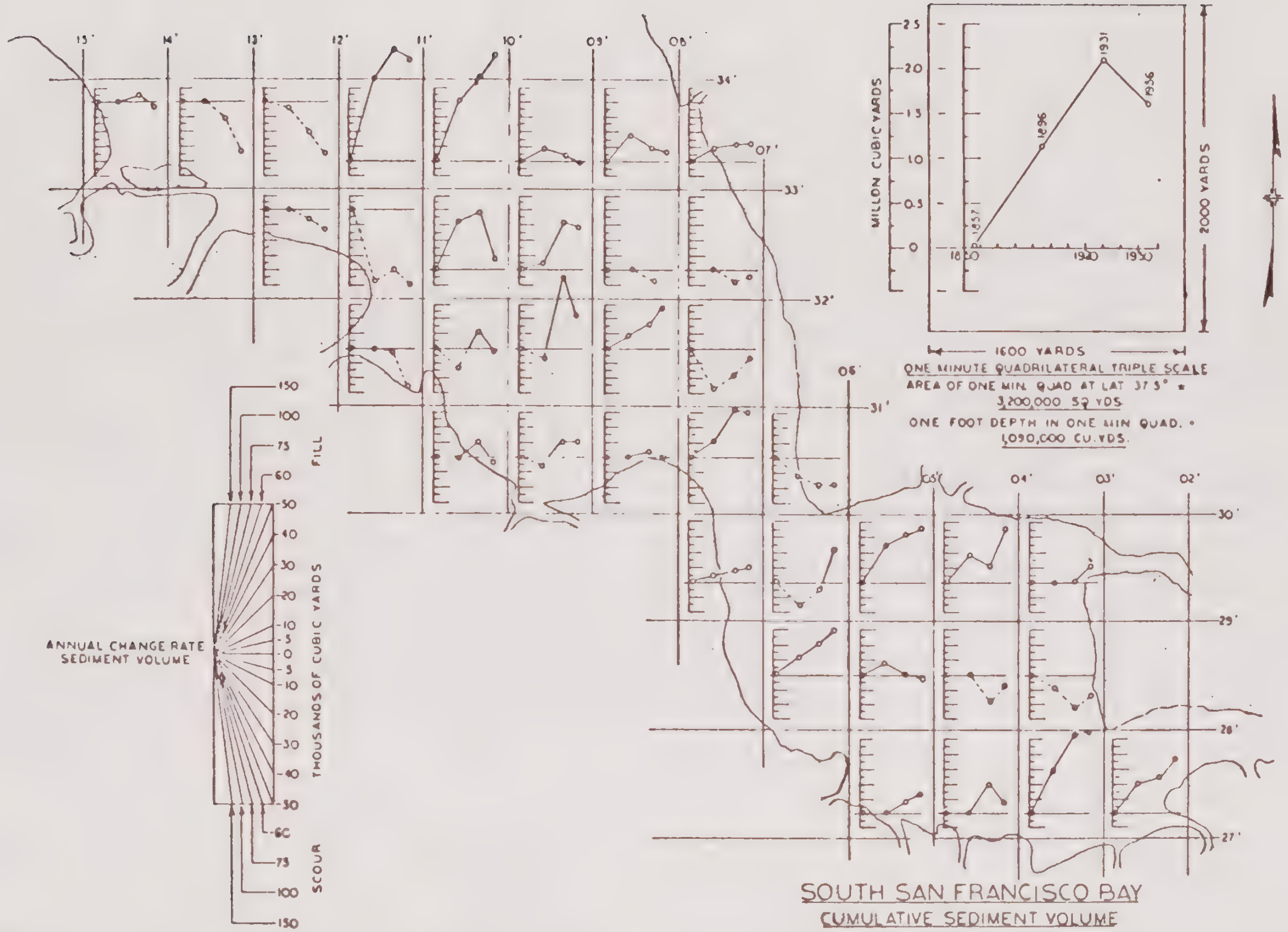


FIGURE III-4 SHOAL AREAS AND TYPICAL CROSS SECTION OF SOUTH SAN FRANCISCO BAY



SOUTH SAN FRANCISCO BAY
CUMULATIVE SEDIMENT VOLUME
CHANGE CURVES

Source: U.S.D.A. Misc. Pub. 970, 1950

FIGURE III-5 CUMULATIVE SEDIMENT VOLUME CHANGE CURVES OF SOUTH SAN FRANCISCO BAY, 37°35' to 37°27' N

Seismic Setting

The San Francisco Bay Area has a long history of seismic activity and related earth movements.[16,18-20] Measured accumulated strains across the major Bay Area faults (San Andreas, Hayward, and Calaveras) indicate the inevitability of future earthquakes.[5,11-14] The Bay Area counties have experienced at least 12 damaging earthquakes in the last century. For planning purposes, these data may be used to estimate the frequencies of large earthquakes for major sections of the Bay Area; these frequencies are generally considered to be every 50 to 100 years.[16,21,22] Maximum forces generated may be comparable to those of the 1906 San Francisco earthquake.[5]

Figure III-6 shows the larger seismic events recorded in the vicinity of the project from 1800 to 1971.[16] Brown and Lee[19] have mapped several low-intensity epicenters in the vicinity for the period 1967-1970. Significant recent activity has occurred along the stretch of the Hayward-Calaveras fault zone immediately adjacent to the project site. Historical records of earthquake damage in the Bay Area show a greater seismic hazard associated with structures built on fills or unconsolidated sediments than for those on firmer soils or bedrock.[5]

Microseismic activity in the Santa Clara Valley has been well documented in recent years. Microseisms include the small adjustments in the earth's crust which are not generally of sufficient magnitude to be detected by humans. Microseismic activity is generally associated with areas subject to large-scale events. A recent study by Mayer-Rosa[27] examined microearthquakes in the area. Events recorded for a two-month period in 1971 are listed in Table III-3. It is significant to note that, although not of extreme magnitude, seismic events are common. Figure III-7 shows the location and depth of these microevents in relationship to the local fault systems. Although activity is predominantly along the Hayward-Calaveras fault zones, moderate

activity is recorded along the traceable surface expression of the Silver Creek-Coyote Creek fault.

Table III-3

SUMMARY OF SANTA CLARA COUNTY EARTHQUAKES

1971	HR	MN	SEC	Lat. N	Long. W	Depth	Mag.
OCT 14	17	59	59.84	37-09.68	121-37.67	0.0	
15	1	4	31.49	37-21.89	121-44.77	5.0	0.5
16	15	59	42.71	37-17.92	121-41.09	1.2	0.7
17	20	42	14.28	37-15.56	121-38.89	4.2	
20	1	44	34.20	37-17.05	121-40.15	3.4	0.5
21	11	20	57.89	37-11.15	121-36.07	5.5	0.3
23	5	18	49.48	37-23.41	121-46.32	0.6	1.1
23	10	4	23.50	37-11.27	121-40.56	8.9	0.1
24	18	51	9.42	37-23.43	121-45.48	2.3	0.6
27	6	33	21.98	37-18.74	121-41.59	8.6	0.5
30	2	17	56.89	37- 8.30	121-32.02	7.5	0.4
31	6	6	5.09	37-22.77	121-45.48	6.9	1.7
31	6	13	14.70	37-22.90	121-45.48	6.9	1.7
31	8	45	14.44	37-22.87	121-45.19	5.9	1.3
NOV 2	22	29	25.21	37- 8.68	121-33.42	7.7	
4	3	34	34.76	37- 9.26	121-33.40	4.7	1.1
4	3	36	17.65	37- 9.02	121-33.25	5.7	
6	3	14	33.86	37- 5.79	121-32.39	5.0	
6	10	38	17.45	37-14.41	121-36.03	8.6	
6	12	9	54.29	37-11.44	121-38.47	4.9	
7	17	55	2.53	37-17.62	121-39.09	7.3	1.4
7	18	42	8.79	37-15.56	121-37.28	8.6	0.9
7	21	31	48.09	37-13.14	121-38.60	4.8	
10	11	33	56.38	37-10.39	121-34.21	9.0	0.6
10	15	3	13.31	37-19.71	121-45.33	2.4	1.4
13	12	53	0.13	37-19.35	121-45.48	2.3	1.5
13	16	21	54.94	37-16.77	121-39.98	9.4	
15	15	2	44.17	37- 9.31	121-33.74	4.9	0.9
15	23	54	55.80	37- 8.83	121-33.72	7.4	0.3
16	5	37	48.59	37-21.67	121-44.36	4.1	
16	16	1	4.90	37-18.07	121-40.70	1.3	
16	18	58	51.62	37-18.04	121-40.72	1.1	0.9
17	3	31	5.63	37- 8.97	121-36.53	8.6	0.4
17	11	3	5.74	37-15.61	121-39.03	3.3	2.1
18	1	44	1.12	37- 8.03	121-32.83	3.8	
19	14	48	48.87	37-10.77	121-41.27	1.3	0.3
22	11	6	23.28	37-13.71	121-42.45	5.7	1.0
25	9	17	23.03	37-10.33	121-34.39	4.4	0.7
25	10	5	28.72	37-17.44	121-40.89	2.8	0.4
27	11	19	41.77	37-10.36	121-36.61	6.7	0.1

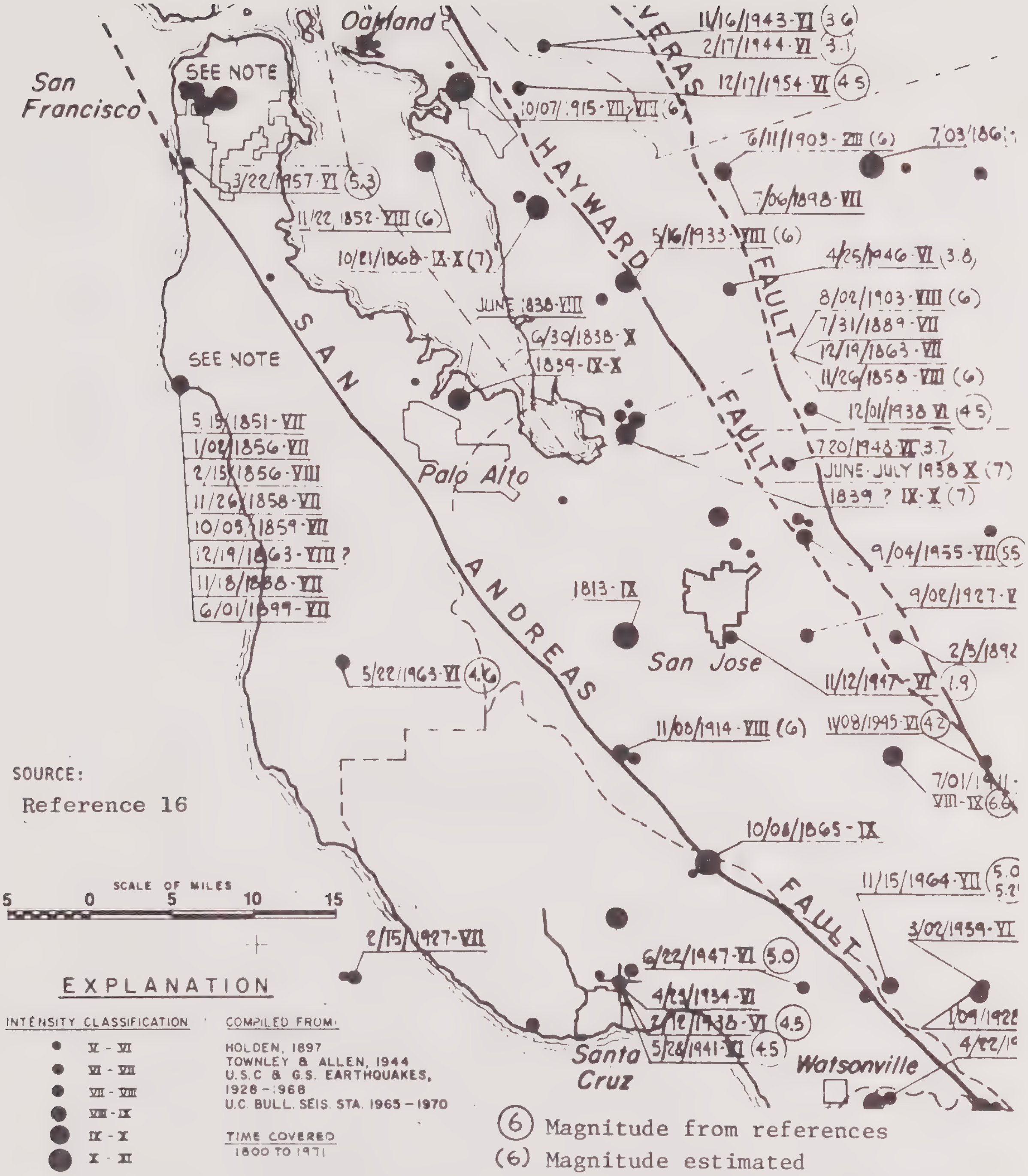
Table III-3 (continued)

SUMMARY OF SANTA CLARA COUNTY EARTHQUAKES

1971	HR	MN	SEC	Lat. N	Long. W	Depth	Mag.
NOV 27	16	38	31.33	37- 8.67	121-33.42	7.6	0.6
28	12	11	37.58	37-17.71	121-39.73	3.5	
30	12	44	18.26	37- 8.61	121-35.42	5.0	
DEC 4	20	0	47.27	37-17.53	121-40.64	1.5	0.9
4	22	28	29.46	37- 8.19	121-34.22	6.3	1.7
6	19	21	1.93	37-18.59	121-43.11	6.2	0.6
6	21	56	38.99	37-21.67	121-46.40	1.1	1.9
6	23	12	43.87	37-22.46	121-44.81	5.6	1.4
8	6	5	5.53	37-22.96	121-45.80	9.6	0.8
8	7	6	50.74	37-22.29	121-44.81	5.7	1.7
8	15	47	58.99	37-19.93	121-45.84	3.1	0.8
8	18	43	3.96	37-20.15	121-42.84	8.9	1.1

KEY:
- HR, MN, SEC } Origin Time
- Lat., Long. } Geographical Coordinates
- Depth - Focal Depth, in Kilometers
- Mag. - Magnitude from Signal Duration (Lee *et al.*, 1972)

Source: Reference 27



NOTE: Epicenters shown for small events prior to 1930 represent the best available information but not necessarily the true epicenter. Where instrumental or intensity studies are not available, locations are given to the nearest simple fraction of a degree or adjacent to the population center reporting maximum intensity.

FIGURE III-6 LARGER RECORDED SEISMIC EVENTS IN THE SAN FRANCISCO BAY AREA

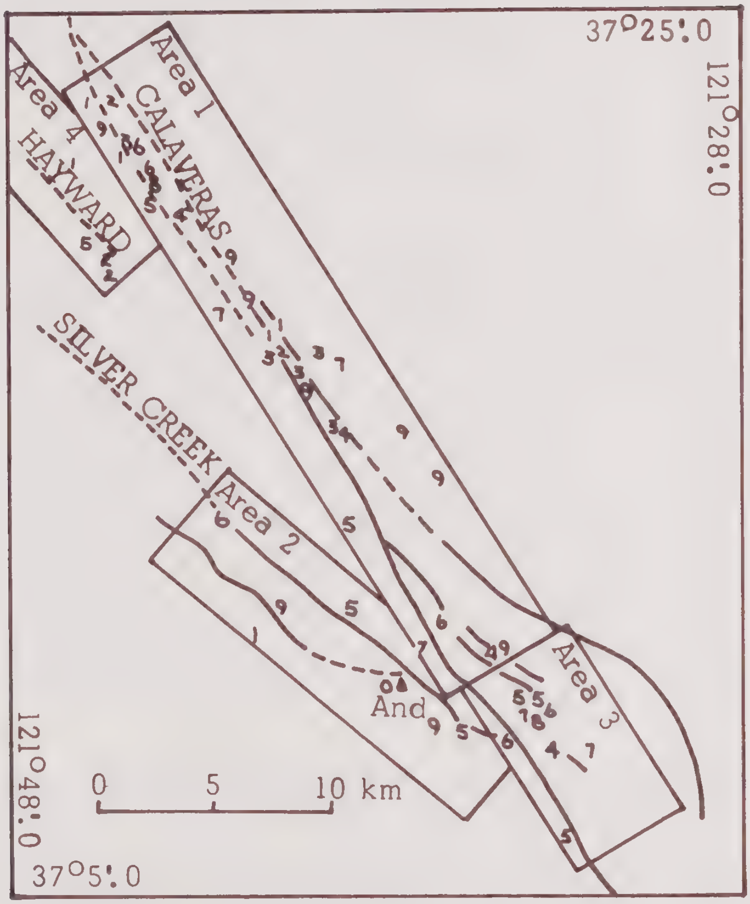


FIGURE III-7 DISTRIBUTION OF EARTHQUAKES IN THE CALAVERAS-SILVER CREEK FAULT ZONE RECORDED OCTOBER 14 TO DECEMBER 8, 1971

The numbers indicate focal depth in kilometers. Solid line indicates established surface fault trace; dashed line, approximately located surface fault trace.

Natural Resources

Potential natural resources in the valley floor of the East Zone are essentially limited to minor gravel deposits and fill materials of varying quality. The gravel deposits are in the quaternary fluvial deposits that lie chiefly along Coyote Creek in the upper portions of the valley. Some of the grading spoils will be of acceptable quality as fill and topsoil.

As reported in the Urban Geology Master Plan for California:[34/]

> "Loss of mineral resources due to urbanization between 1970 and the year 2000 is estimated to total $17 billion if current practices are continued. The mineral resources under greatest urbanization pressure are the construction materials, especially sand and gravel and crushed stone. The estimated losses are based largely on the added cost to the public due to increased transportation costs, the cost of relocating mining operations farther from markets, and the use of lower grade deposits that require more processing . . . The environmental costs of mining deposits farther from markets, such as more vehicles required, more fuel used, and resultant increased air pollution, and increased road maintenance, are not included in the cost figures herein.
>
> "The per capita demand for construction materials has increased in the past and is expected to continue to increase in the future. Therefore, even more construction materials than are currently used per year will be required in the future despite lowered population growth expectations."

In addition to the direct loss of materials by their use in levee construction, etc., the emplacement of various channel improvements will form a permanent barrier to the exploitation of surrounding areas. Although the quantity of usable alluvial materials "lost" through implementation of the project is minor when compared to the total suitable fill in the valley, it must be kept in mind that as urbanization expands, fewer and fewer open sites will remain. At some future stage, accessible creek

beds may in fact represent a significant portion of available fill materials.

Rock lining for selected channels will represent additional demand on local natural resources. As suitably sized material is probably not available locally in the valley floor, such material will probably be imported from quarry sites in the hills. Use of material from such sources is not thought to represent significant impact on the area's resources of rock.

Perhaps the most significant use of natural resources will be the amounts of concrete, sand, and gravel required for lined channels, pipes, and so on. It is impossible to evaluate the total impact of the use of such materials, but it is safe to say that such use will represent an incremental depletion of a finite resource.

Water Quality

In a 1972 report published by the Santa Clara County Flood Control and Water District, "Draft Report on Water Quality in Santa Clara County," several general conclusions are reached. The District recognizes that additional water supplies will be needed within 10 years if the current rate of urbanization continues. Either additional local surface water supplies must be developed, additional water must be imported, or wastewater must be reclaimed. In order to determine the most appropriate course of action, an evaluation of the present water quality is necessary. In this connection the District is now considering the development of a comprehensive water quality monitoring program.

Relatively little data exists on water quality in the East Zone of the District. The available data is in the files of the Resources Management Division of the District. Briefly, this information originated from the following sources:

- Data for 1957-1962 collected by the district and analyzed by the State Department of Water Resources.
- U.S. Geologic Survey analyses of trace elements in groundwater.
- Local water company data.
- District well analyses in the vicinity of San Francisco Bay.
- State Department of Water Resources Series 65 and 130.
- District surface reservoir water quality data.
- Sewage treatment plant influent and effluent data.

This information is for the entire county, mostly outside of the East Zone. The only data available specifically for the East Zone is for Coyote Creek

and Anderson Reservoir surface water. The general conclusions presented for these water bodies in the district's 1972 report are as follows:

> "The water quality of Coyote Creek is fairly good and the mineral content is within the permissible limit for drinking water standards. The maximum boron content was 0.3 ppm in 1964 and 1968, while in all other years it ranged from 0.2 to 0.3 ppm. This water consistently meets the criteria for a Class I irrigation water."

> "Water quality of Anderson Reservoir is fairly good to excellent. It meets the water quality standards established by USPHS. The TDS varies from 320 ppm to 500 ppm; thus, it is below the recommended limit. It is observed that the hardness of water increased in the year 1971 compared to 1969 and 1970, with a maximum of 222 ppm in November 1971. The water of Anderson Reservoir can be considered as moderately hard to hard water."

To supplement this information, URS Research Company conducted a limited monitoring program to measure dissolved oxygen, pH, temperature, conductivity, and salinity in Coyote and Penitencia Creeks.* Table III-4 shows the results of this effort, and Figure III-8 shows the approximate location of the sampling stations. Stations 1-5 and 8 represent normal Coyote Creek situations, with little influence from external pollution sources, including tidal flow. The pH varies between 7.0 and 8.6, the dissolved oxygen between 6.4 and 10.2 mg/ℓ, the temperature between 18.3°C and 22.3°C, (64.9°F-72.1°F), the conductivity between 0.3 and 0.6 mΩ, and the salinity between 0.2 and 0.4 parts per thousand (ppt). Stations 6 and 7 were closer to South San Francisco Bay, and reflect its influence. Here the conductivity jumped to 3.5 and 6.1 mΩ, the salinity increased to 2.2 and 3.6 ppt, the temperature rose to 21.8 and 25.5°C (71.2-77.9°F), the pH was somewhat lower at 6.5 to 7.3, and the dissolved oxygen was quite a bit lower at 0.4 and 1.0 mg/ℓ. The main influence on conductivity, salinity, temperature, and pH at these last two stations was the saline bay water, while the dissolved oxygen

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*Using the Interocean Systems induction salinometer system.

Table III-4

RESULTS OF COYOTE AND PENITENCIA CREEKS
WATER QUALITY MONITORING PROGRAM

Station	Location	Conductivity (mΩ)	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/ℓ)	pH
1	Coyote Creek above Hellyer, near algae, in sun, at edge	0.3	0.2	19.0	10.2	7.5
2	As above, center of pond, sun, no algae	0.3	0.2	18.5	7.0	7.0
3	As above, edge, in shade	0.34	0.24	18.4	6.6	6.9
4	As above, but further upstream, swifter flowing stream	0.33	0.2	18.3	6.4	7.0
5	Route 237 and Coyote	0.57	0.38	21.6	6.9	8.6
6	Coyote Creek near Collier charcoal plant	3.5	2.2	21.8	0.4	6.5
7	Coyote Creek near (100m) bay/estuary	6.1	3.6	25.5	1.0	7.3
8	Coyote Creek at flea market	0.39	0.29	22.3	6.95	8.6
9	Penitencia Creek at Alum Rock Park, lower picnic area	1.88	1.26	20.6	7.85	7.44

Table III-4 (continued)

RESULTS OF COYOTE AND PENITENCIA CREEKS
WATER QUALITY MONITORING PROGRAM

Station	Location	Conductivity (mΩ)	Salinity (ppt)	Temperature (^{o}C)	Dissolved Oxygen (mg/ℓ)	pH
10	As above, farther upstream, beneath Sulfur Spring	2.37	1.45	25.10	7.05	7.19
11	Spring water in Alum Rock Park	- -	- -	- -	0.4	5.8
12	Penitencia Creek at White Road	0.91	- -	22.81	7.48	8.55

Source: URS Research Company

FIGURE III-8 WATER QUALITY SAMPLING STATIONS FOR URS MONITORING PROGRAM

was affected by sewage effluent. As these last two stations were tested during flood water (rising tide) conditions, it is seen that the bay's influence extends an appreciable distance upstream.

The two major human influences on water quality in the Santa Clara Valley are sewage discharges and urban storm water runoff. (Natural influences on the water quality are mostly restricted to the bay.) The sewage effluent influences river and creek reaches near and downstream of the discharge locations. Increased discharges, caused by population growth, would increase the associated pollution problems. Table III-5 summarizes the treatment plant facilities' characteristics (as of 1970) for the three treatment plants within the study area (San Jose/Santa Clara, Milpitas, and Alviso).

Table III-5

MUNICIPAL TREATMENT FACILITY CHARACTERISTICS, 1970

Municipality	Design Capacity (MGD)	Average Annual Flow (MGD)	Average Annual BOD_5 Discharge (lbs/day)	Type of Treatment	Discharge Location
San Jose/ Santa Clara	94.0	75.0	25,750	Primary Biological secondary Disinfection	Artesian Slough
Alviso (Municipal only)	0.52	0.18	8	Primary Biological secondary Stabilization pond Disinfection	Slough
Milpitas	4.5	2.8	345	Primary Biological secondary Disinfection	Coyote Creek

Source: Santa Clara County Flood Control and Water District.

It is seen that the San Jose facility handles most of the sewage flows discharged in this area. The present population in the East Zone accounts for all the Milpitas and Alviso discharges, but less than a third of the San Jose discharge. The San Jose plant discharges close to 100 MGD (originating outside of the East Zone) during the canning season. The San Jose facility is currently undergoing an expansion program; the resultant treatment capacity will be about 160 MGD (the expansion is about 98 percent completed). The Milpitas and Alviso plants have made no expansion plans, as they are scheduled to be shut down, within the next several years, and their waste will be directed to the San Jose facility.

Table III-6 shows current discharge characteristics of the San Jose and Milpitas facilities. It is seen that the current population of the East Zone contributes significant quantities of pollution to the South Bay. The actual volume of East Zone-related discharges is about 30 MGD, while the municipal South Bay discharges total about 150 MGD, and the total industrial discharges are about 15 MGD. The East Zone contributes about 20 percent of the total municipal and industrial discharges to the South Bay.

A large area in the East Zone is currently not served by municipal treatment facilities. These sewage flows are discharged in private septic tanks. The San Jose facility has a partially completed sewage main running through the Coyote-Morgan Hill area, but it is not yet in operation.

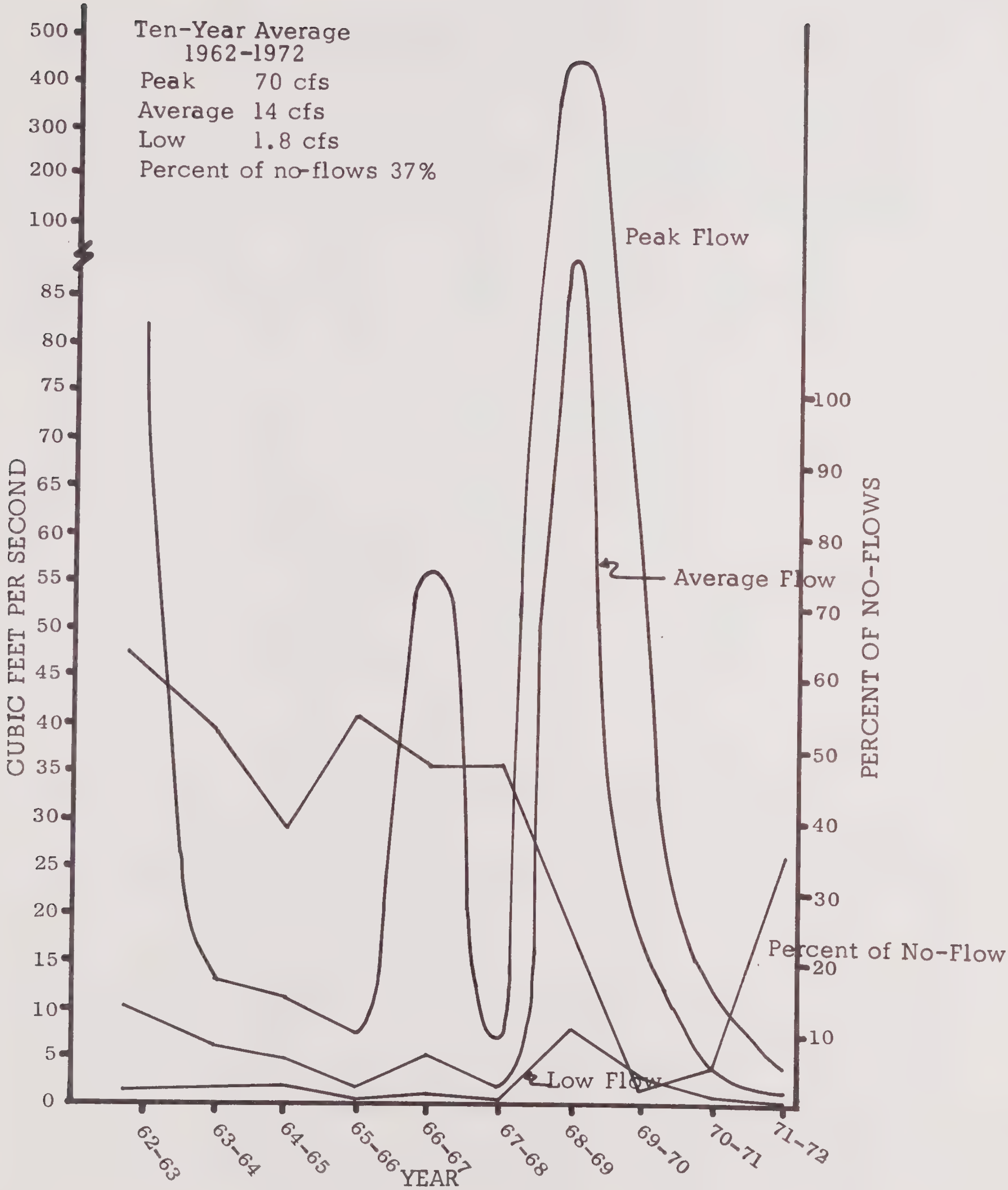
In order to determine the East Zone influences on South Bay water quality, it is necessary to determine the amount of stream flow and its inherent quality. Figures III-9 through III-15 show yearly and/or monthly flow trends for Coyote, Upper Penitencia, Berryessa, Silver, and Yerba Buena Creeks. The locations of the gaging stations are shown on Figure III-8. Table III-7 is a summary of these flow patterns.

Table III-6

CURRENT WASTE DISCHARGES FROM MUNICIPAL TREATMENT PLANTS

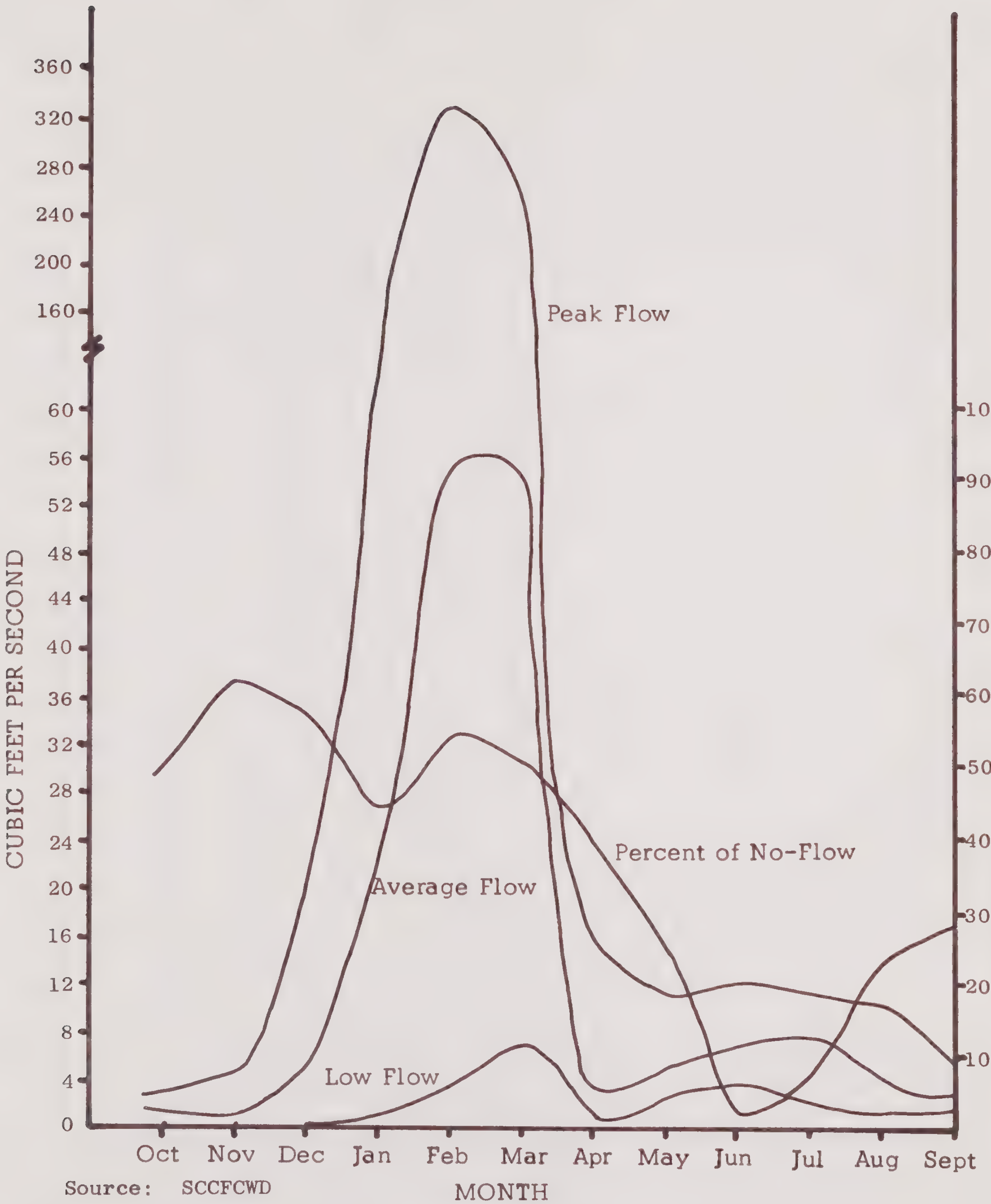
Water Quality Parameter	San Jose-Santa Clara Facility (mg/ℓ)	Milpitas Facility (mg/ℓ)	Total Discharge (tons/year)	Discharge due to East Zone (tons in 1970)
Sodium	170.0	111.0	18,000	7,200
Potassium	16.8	7.3	1,800	720
Calcium	64.0	32.3	6,800	2,700
Magnesium	15.3	12.3	1,600	640
Ammonia (as N)	35.6	22.0	3,900	1,600
Chloride	193.0	90.0	20,000	8,000
Sulphate	97.0	119.0	10,000	4,000
Bicarbonate (as $CaCO_3$)	343.0	202.0	37,000	15,000
Total Phosphate (as P)	9.3	10.0	1,000	400
Nitrate (as N)	0.12	0.05	13	5
Total Dissolved Solids (TDS)	782.0	490.0	84,000	34,000
Alkalinity (As $CaCO_3$)	353.0	202.0	38,000	15,000
Hardness (As $CaCO_3$)	222.0	123.0	24,000	9,600
Boron	0.7	0.7	74	30
BOD_5	- -	- -	4,800	1,900
COD	61.5	60.0	6,800	2,700
Sp. Conductance (μmhos/cm)	1,308.0	783.0	NA	NA

Source: Santa Clara County Flood Control and Water District.



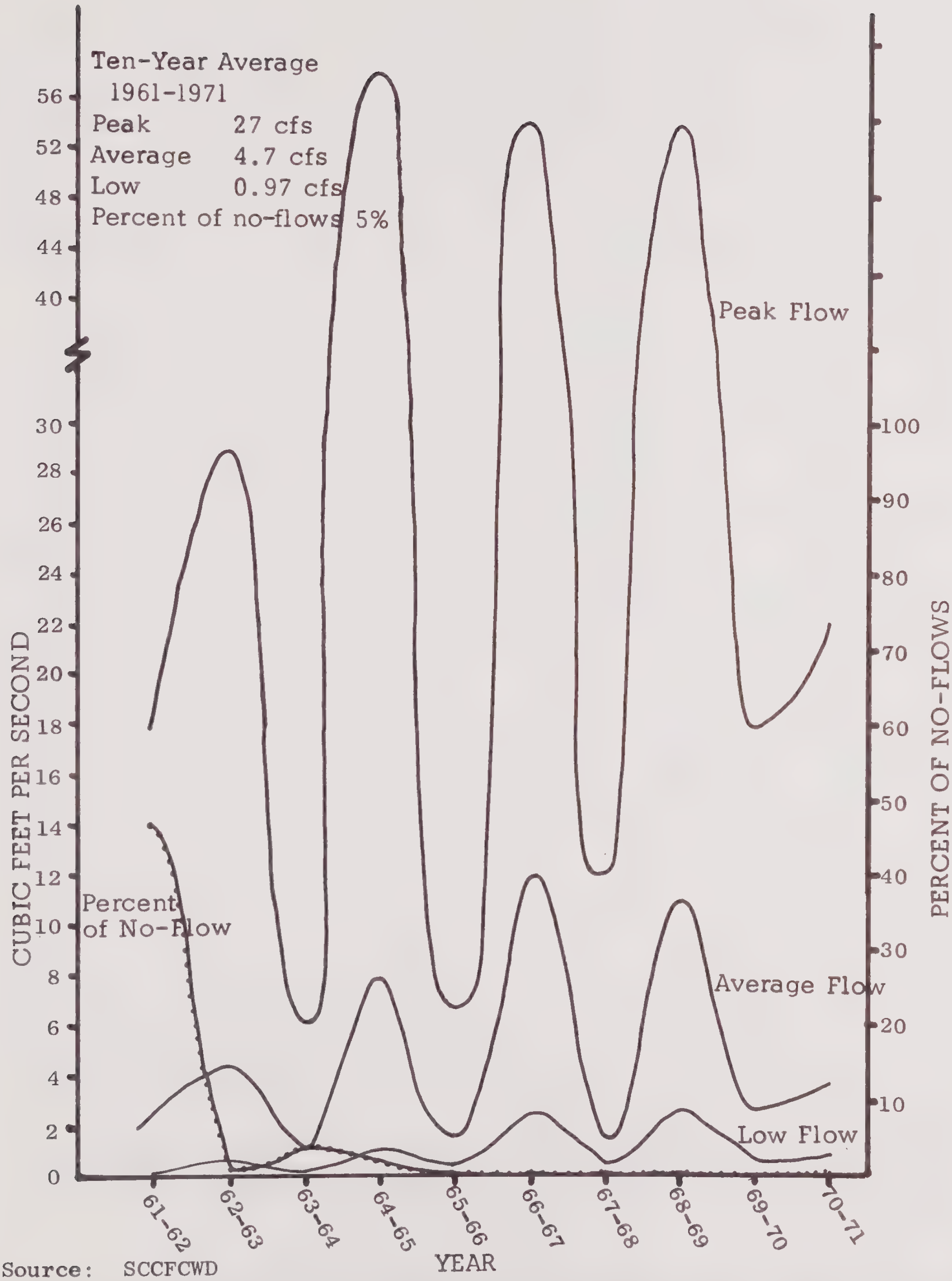
Source: Santa Clara County Flood Control and Water District

FIGURE III-9 YEARLY FLOW TRENDS FOR COYOTE CREEK (near Edenvale: Station A)



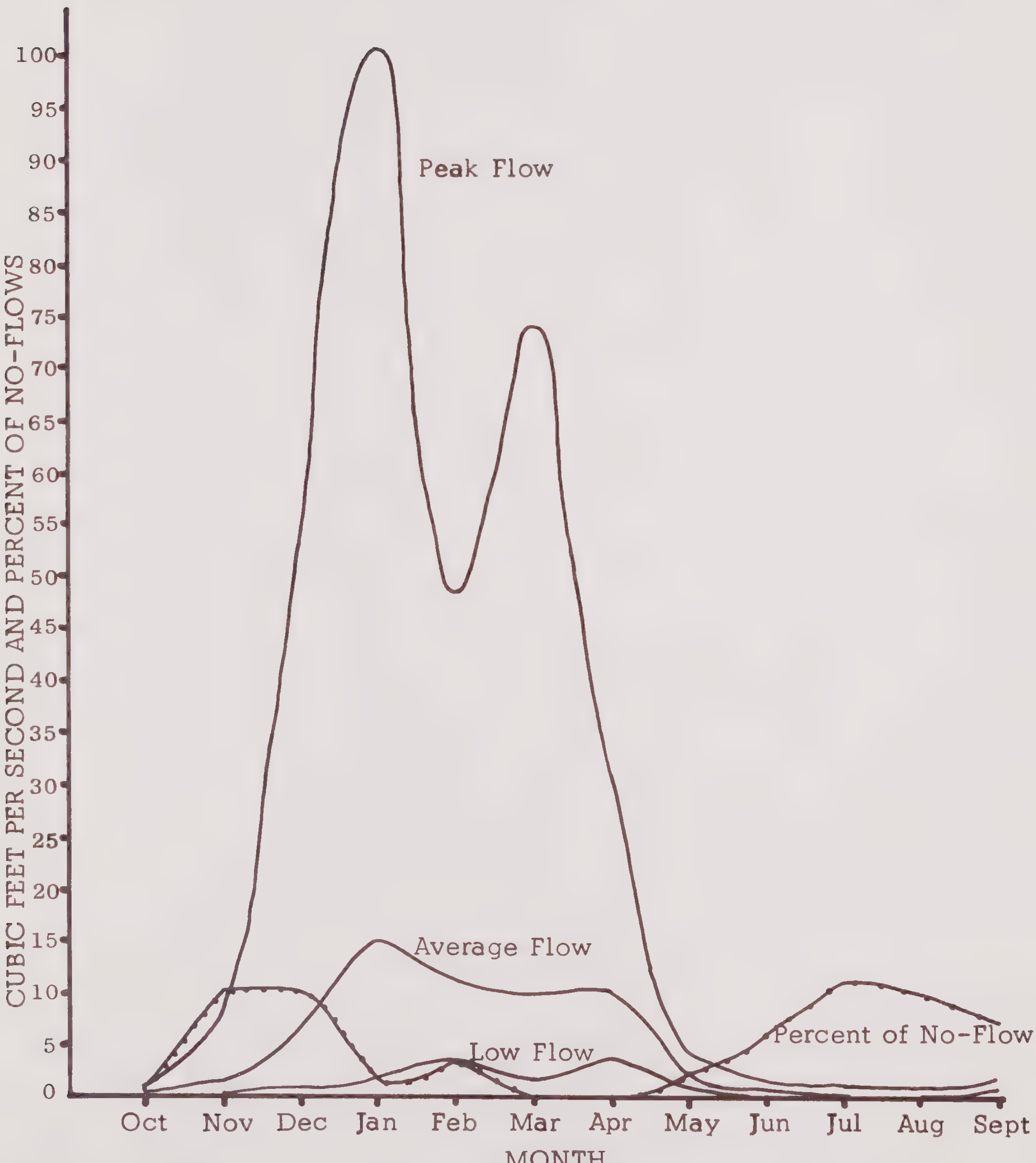
Source: SCCFCWD

FIGURE III-10 MONTHLY FLOW TRENDS FOR COYOTE CREEK (near Edenvale: Station A) (October 1962 - September 1972)



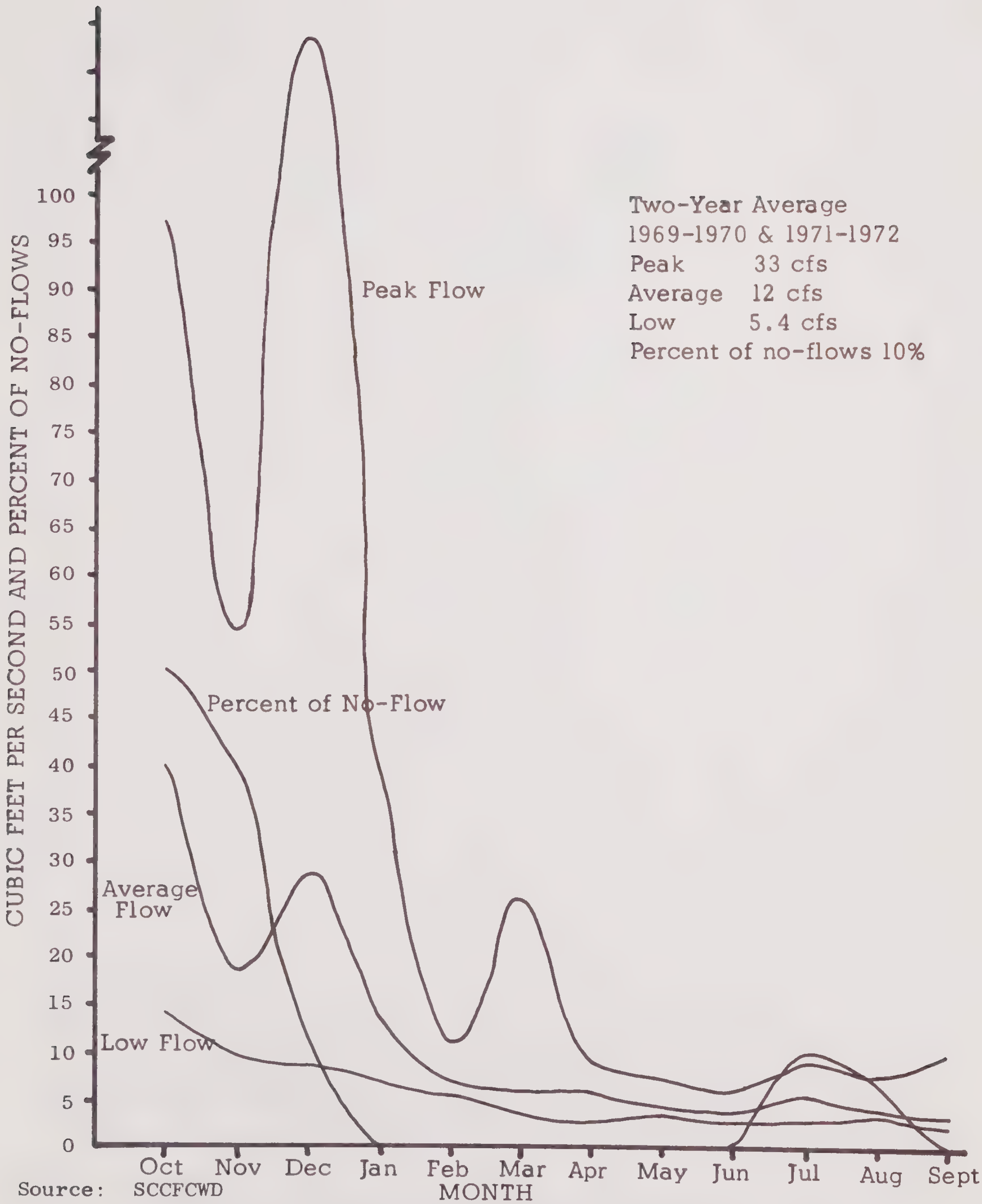
Source: SCCFCWD

FIGURE III-11 YEARLY FLOW TRENDS FOR UPPER PENITENCIA CREEK (Station B)



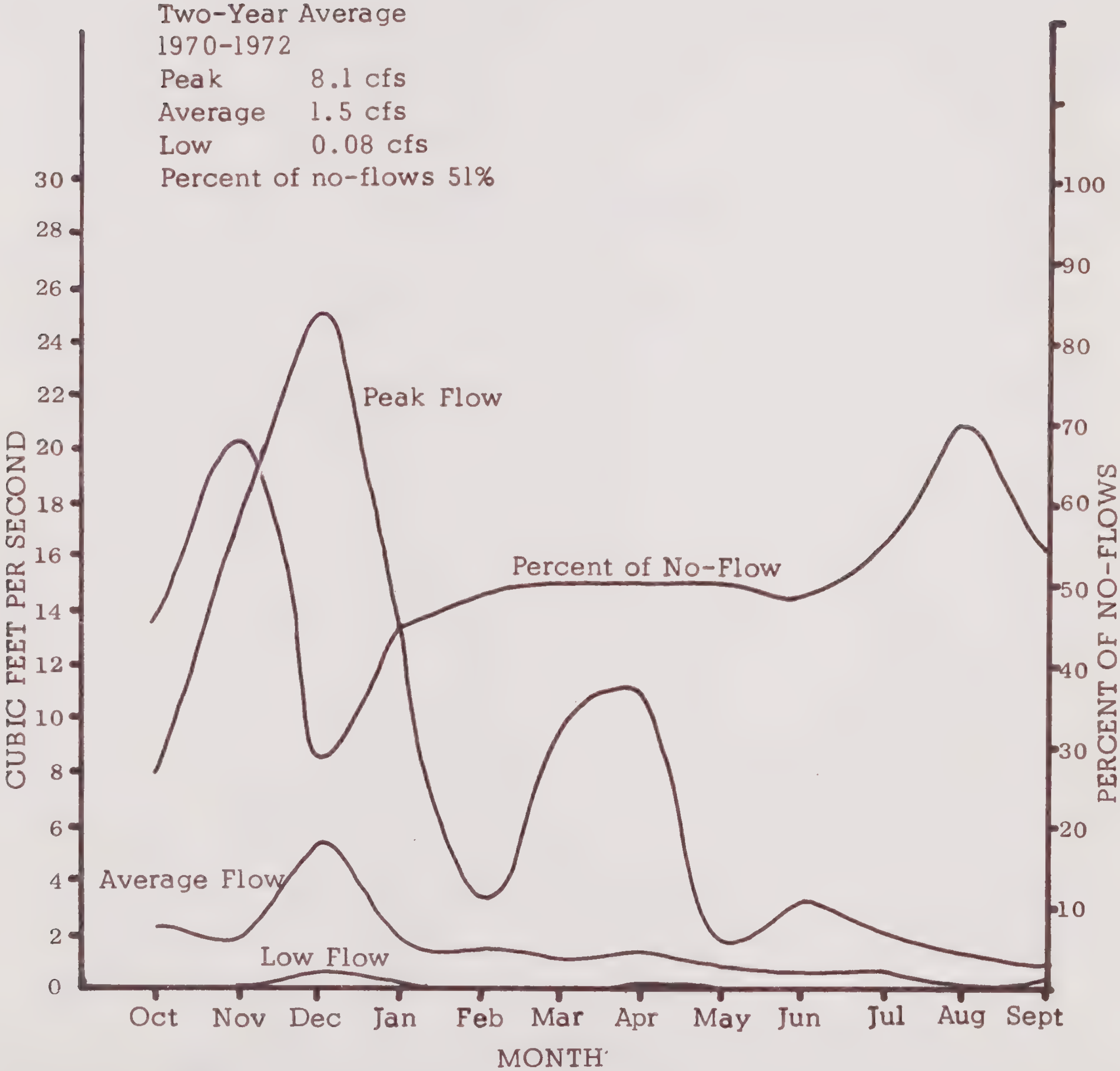
Source: SCCFCWD

FIGURE III-12 MONTHLY FLOW TRENDS FOR UPPER PENITENCIA CREEK (Station B)



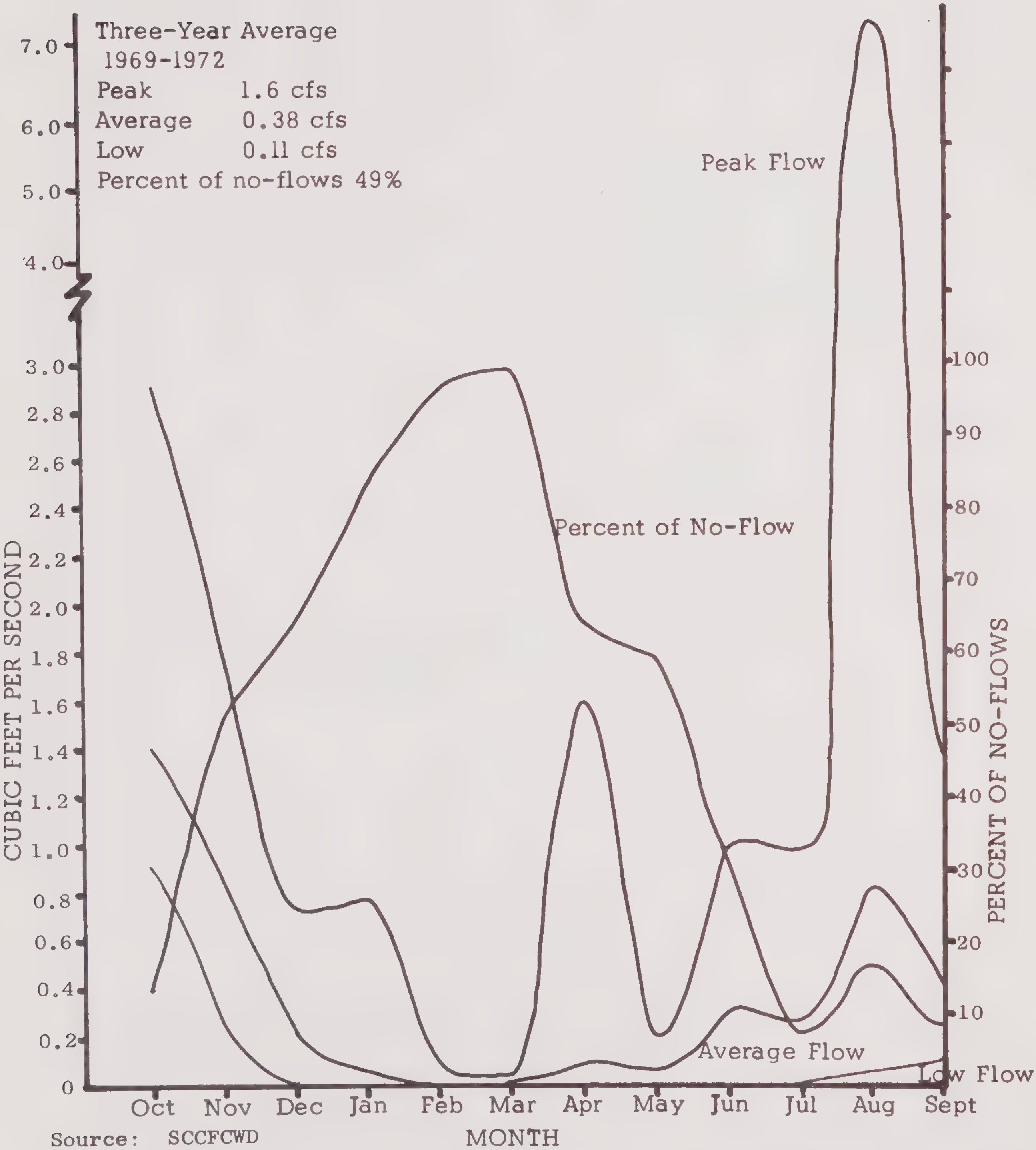
Source: SCCFCWD

FIGURE III-13 MONTHLY FLOW TRENDS FOR BERRYESSA CREEK
(above Calaveras Road: Station C)



Source: SCCFCWD

FIGURE III-14 MONTHLY FLOW TRENDS FOR SILVER CREEK (below King Road: Station D)



Source: SCCFCWD

FIGURE III-15 MONTHLY FLOW TRENDS FOR YERBA BUENA CREEK (at San Felipe Road: Station E)

Table III-7

APPROXIMATE SUMMARIES OF
WATER FLOW CHARACTERISTICS: EAST ZONE

		Yearly Flows (cfs)				Monthly Flows (cfs)	
Creek	Station	Average	Peak	Low	No Flow (%)	Peak/Mo.	Low/Mo.
Coyote	A	10.0	25.0	2.0	30	320 / Feb (Dec-March)	0 / Oct-Jan
Upper Penitencia	B	5.0	25.0	1.0	1	100 / Jan (Nov-May)	0 / July-Nov
Berryessa	C	15.0	50.0	5.0	10	130 / Dec (Oct-Jan)	2 / April-Sept
Silver	D	3.0	9.0	0	50	25 / Dec	0 / Feb-Nov
Yerba Buena	E	0.3	1.3	0.2	50	7 / Aug	0 / Dec-July

Source: Compiled by URS Research Company.

There was no gaging station near the mouth of Coyote Creek, so this discharge must be estimated. From available data, it seems that the average discharge here would be between 25 cfs and 50 cfs (or 15-30 MGD). The peak flow may vary between 75 and 250 cfs (45-150 MGD).

The characteristics of storm water runoff depend on many factors in addition to flow quantities -- time since the beginning of the rainfall, street sweeping and rain history, percentage of impervious areas, land uses, average slope, etc. The total area of the Coyote Creek watershed is about 350 square miles or 220,000 acres. From past testing in the San Jose area, specific storm water loadings per capita have been determined. These are given in Table III-8.

When these values are compared to the municipal discharges, it is seen that the storm water discharges add appreciable amounts, especially for COD. It is expected that the BOD_5 would be much greater if it were not for toxic interferences (synergism) from the heavy metals. The permissible USPHS surface water criteria for drinking supplies may be exceeded for all controlled pollutants during periods of rain.

It is believed that the East Zone is presently responsible for less than 20 percent of the pollutant discharges into the South Bay. The water of the South Bay is considered to be of poor quality, but has shown marked improvement over the past several years. Plans call for reducing pollutant discharges even more, but the exact degree of such reductions is presently not known. Table III-9 shows the water quality of the South Bay (1966) in relation to other parts of the bay. The parameters which indicate sewage effluent contaminations (DO, BOD, ammonia, nitrogen, and coliform bacteria) were all higher in the South Bay than elsewhere in 1966.

Table III-8

POSSIBLE 1970 RANGES OF POLLUTANTS IN CREEKS IN THE EAST ZONE DUE TO STORM WATER RUNOFF
(Total amounts, not necessarily immediately soluble)

Parameter	Approximate Lbs/Person/Year	1970 Total Tons/Year	Possible 1970 Concentrations in Creeks due to Storm Water Runoff (mg/ℓ)	USPHS Permissible Water Quality for Public Water Supplies (mg/ℓ)
BOD_5	4	900	30 - 300	- -
COD	23	5,200	180 - 1,800	- -
$PO_4^{\equiv}$	0.3	68	2.3 - 23	Narrative
NO_3^-	0.007	1.6	0.05 - 0.5	10
N	0.6	140	5 - 50	- -
Solids	370	83,000	2,800 - 28,000	- -
Cd	0.0007	0.16	0.005 - 0.05	0.01
Ni	0.015	3.4	0.12 - 1.2	- -
Pb	0.15	34	1.2 - 12	0.05
Zn	0.22	50	1.7 - 17	5.0
Cu	0.05	11	0.37 - 3.7	1.0

Source: URS Research Company

Table III-9

SUMMARY OF WATER QUALITY CHARACTERISTICS OBSERVED IN SAN FRANCISCO BAY

Parameter	Unit		South Bay	Lower Bay	Central Bay	North Bay	San Pablo Bay	Suisun Bay
Temperature	°C	low[a]	9.3	10.7	10.1	11.3	8.3	6.9
		mean	16.3	14.8	13.5	14.1	14.9	15.0
		high[b]	24.0	21.0	19.0	17.6	19.3	21.3
Secchi disc transparency	ft	low	0.5	0.5	1.0	1.3	0.5	0.5
		mean	1.9	3.5	4.6	3.9	1.6	0.9
		high	4.0	8.5	9.0	6.5	3.5	1.5
pH		low	7.2	7.8	7.6	7.5	7.2	7.4
		mean	7.6	7.95	7.9	7.85	7.65	7.65
		high	8.0	8.1	8.1	8.0	7.9	8.0
Suspended solids	mg/ℓ	low	15	8	5	6	13	34
		mean	55	29	15	21	45	65
		high	164	56	38	57	245	112
Chlorosity	g/ℓ	low	9.5	13.5	15.5	10	3.5	0.02
		mean	15	16	16.5	16	10.5	2.5
		high	19	17	18	18	16	8.5
Dissolved oxygen	mg/ℓ	low	0.7	7.0	6.5	6.2	6.8	6.6
		mean	5.1	7.4	7.3	7.4	8.0	8.4
		high	8.3	8.5	8.2	8.5	9.3	10.2
Dissolved oxygen saturation	%	low	9.3	81	80	75	80	65
		mean	55	90	84	85	85	85
		high	92	99	92	96	92	94
Biochemical oxygen demand	mg/ℓ	low	0.5	0.4	0.4	0.1	0.1	0.4
		mean	10	0.8	0.7	0.7	0.8	1.1
		high	48	1.5	1.0	1.5	1.4	2.1
Ammonia nitrogen	mg/ℓ	low	-	0.06	0.05	0.03	0.06	0.01
		mean	3	0.12	0.15	0.13	0.15	0.13
		high	11	0.21	0.48	0.24	0.34	0.28
Nitrate nitrogen	mg/ℓ	low	0.05	0.08	0.16	0.12	0.03	0.04
		mean	0.35	0.34	0.24	0.23	0.35	0.31
		high	1.1	0.55	0.36	0.38	1.0	0.95
Reactive phosphate	mg/ℓ	low	-	0.3	0.2	0.2	0.2	0.1
		mean	-	0.5	0.32	0.2	0.30	0.20
		high	-	0.8	0.4	0.4	0.4	0.3
Dissolved silica	mg/ℓ	low	2.3	2.9	1.4	2.5	1.4	1.5
		mean	8.7	5.4	3.6	4.8	6.8	13.6
		high	16	7.7	5.5	6.8	14	30
Coliform bacteria	MPN/100 mℓ	low	10	10	200	200	20	700
		mean	2×10^4	5×10^2	1×10^3	5×10^2	1×10^3	3×10^3
		high	3×10^8	3×10^4	6×10^4	1×10^4	1×10^4	2×10^4
Total microplankton	cells/ℓ	low	1.2×10^3	3.0×10^3	6.6×10^3	7.0×10^3	3.0×10^3	4.6×10^4
		mean	1.4×10^4	1.0×10^4	3.7×10^4	3.2×10^4	4.7×10^4	3.6×10^5
		high	3.8×10^5	1.5×10^6	6.7×10^5	3.0×10^5	1.2×10^6	3.4×10^6
Total zooplankton	org/cu m	low	500	5,400	3,000	1,000	300	500
		mean	7,000	8,800	7,800	8,000	10,000	3,000
		high	40,000	12,000	15,000	23,000	32,000	19,000

a. Low ≡ 5 percentile value
b. High ≡ 95 percentile value

Source: SERL, University of California, Berkeley, 1966.

Climatology

Like the rest of the San Francisco Bay Area, the Santa Clara Valley has a Mediterranean-type climate, with warm, dry summers and mild, wet winters; temperatures seldom fall below freezing. The summer weather is dominated by a sea breeze, caused by differential heating between the interior valleys and the coast, that moderates temperatures in the Santa Clara Valley. The winter weather is dominated by storms from the North Pacific which produce virtually all the rainfall in the area. Table III-10 lists 30-year average values for temperature and precipitation at the San Jose Airport. Figure III-16 shows wind direction and wind speed data for the San Jose Area for 1965-1967.

The parameters mentioned above vary somewhat throughout the Santa Clara Valley. Temperatures tend to be somewhat more extreme in the southern part of the valley because it is farther away from the moderating influence of the bay and sea breeze. Temperatures are also slightly more extreme in the foothills bordering the east and west sides of the valley, due to the difference in elevation.

Precipitation also varies within the valley, with slightly increased amounts in the foothills due to the increased elevation and smaller amounts in the southern part of the valley due to the decreasing intensity of storms as they move south. These differences are insignificant, however, when compared to the annual variations in rainfall.

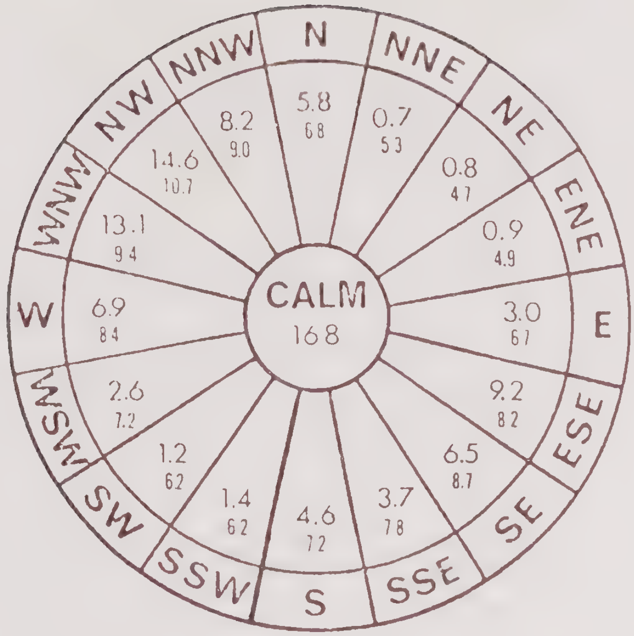
Figure III-16 shows that the prevailing wind direction is generally out of the northwest. This reflects the presence of the sea breeze, which blows generally from the WNW-NW-NNW directions. Another principal wind direction is from the east-southeast, reflecting the fact that winds tend to blow up the Santa Clara Valley during winter storms. This is a good example of how wind is "channeled" through the valley as it narrows in the south. This channeling effect has a definite impact on wind directions in

Table III-10

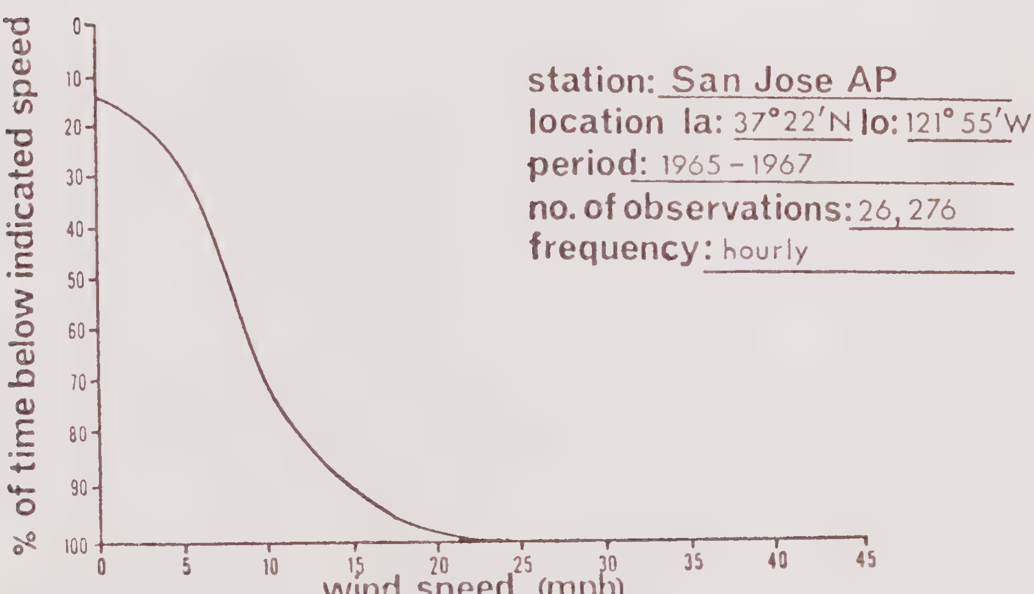
AVERAGE TEMPERATURES AND RAINFALL
IN THE SAN JOSE AREA

Month	Average High Temperature (°F)	Average Low Temperature (°F)	Average Precipitation (in.)
January	58	41	2.7
February	61	43	2.5
March	65	45	2
April	69	47	1
May	73	50	0.4
June	78	53	0.06
July	81	55	Trace
August	80	55	0.03
September	80	55	0.14
October	74	51	0.5
November	66	45	1
December	59	42	2.6
	106 max.	20 min.	13 Ann. Avg.

Source: Bay Area Air Pollution Control District, Aviation Effect on Air Quality in the Bay Region, February 1971.



percentage distribution of wind directions
with mean wind speed beneath



cumulative wind speed distribution

Source: Bay Area Air Pollution Control District, Aviation Effect on Air Quality in the Bay Region, February 1971.

FIGURE III-16 WIND DATA FOR THE SAN JOSE AREA

the area, as winds tend to blow parallel to the valley. In the foothills on the east and west sides of the valley the wind direction and speed vary significantly due to local topographic features; again, winds tend to be channeled up the small valleys in the hills.

The climate in the project area is primarily what has been described above for the foothills, since most of the project area is located in the eastside foothills. Temperatures may be somewhat higher year-round in the project area -- in the summer because of an increase in the amount of solar radiation received, and in the winter primarily because of cold air near the ground flowing downslope and settling in the valleys. This downslope flow of cold air creates a greater tendency toward frosts in the valleys during the winter and a lesser tendency toward frost in the foothills. As mentioned previously, precipitation is slightly greater due to the increased elevation; however, the variation is probably insignificant compared to the annual variation in rainfall.

As mentioned previously, winds are highly variable in the foothills, but the prevailing wind direction is essentially the same as that for the San Jose Airport Area, except in sheltered valleys within the hills. Wind speeds over the foothills may be somewhat reduced due to the fact that the dominant wind is the sea breeze and the eastside foothills are far enough inland that the sea breeze is somewhat dissipated there. During calm conditions, slope winds may develop, causing cold air to flow downslope during the night; upslope winds are also possible during the day under calm conditions.

Air Quality

There is an air monitoring station in San Jose (on Alma Street) operated by the Bay Area Air Pollution Control District. Appendix B presents the 1972 data from this station in the form of monthly averages of the peak and average hours and percentage distribution of pollutant concentrations. Average monthly peak hour concentration of carbon monoxide exceeds the federal eight-hour standard during November, December, and January, and average peak hour concentrations of oxidants are greatest during August. Nitrogen dioxide and particulate averages are well below state and federal standards; hydrocarbon concentrations are not comparable to any standard, since total hydrocarbons are measured at the Alma Street Station and the standard is written for reactive hydrocarbons only.

The percentage distribution curves in the appendix show how often the specific concentrations occur. Oxidant concentrations during peak hours exceed the 0.08 ppm federal standard approximately 5 percent of the time. Average-hour carbon monoxide concentrations exceed the federal eight-hour standard occasionally (approximately 1 percent of the time), but peak concentrations almost never exceed the one-hour standard. Nitrogen dioxide and particulate concentrations rarely reach concentrations approaching the standard (again, hydrocarbons cannot be related to any standard).

A ground and aerial monitoring effort was carried out to determine the horizontal and vertical gradients of pollutants in the East Zone of the flood control district.* The ground monitoring data are presented in Table III-11.

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*The monitoring efforts utilized the following measurement equipment:

MRI integrating nephelometer (for particulate measurements)
DAS1B1 ozone monitor
REM ambient oxides of nitrogen monitor
Ecolyzer carbon monoxide monitor
Climet Model 208A particle size analyzer

Table III-11

RESULTS OF AIR QUALITY MONITORING PROGRAM

Date	Pollutant	Station: Alum Rock Park	Station: Mirrasou Vineyards	Station: Riverside Golf Course	High-Hour Conc. at BAAPCD Alma St. Station
7/26/73	NO (ppm)	0.09	0.08	0.08	--
	NO_x (ppm)	.11	.11	.11	--
	NO_2 (ppm)	.02	.03	.03	0.11
	CO (ppm)	1	.5	1	8
	Particulates ($\mu g/m^3$)	32	30	32	--
	O_3 (ppm)	0.10	0.06	0.10	0.16
8/20/73	NO (ppm)	.10	.09	.08	--
	NO_x (ppm)	.13	.11	.11	--
	NO_2 (ppm)	.02	.02	.03	0.07
	CO (ppm)	< 0.5	< 0.5	0	5
	Particulates[a] ($\mu g/m^3$)	32	32	32	--
	O_3 (ppm)	0.01	0.025	0.023	0.07

a. Particulates are expressed in micrograms/cubic meter as derived from b_{scat} measurements.

Source: URS Research Company.

The sites monitored were distributed fairly evenly on a north-south line through the eastern foothills. The two days of monitoring showed very few differences in pollutant concentrations at the three sites. Oxidant concentration varied slightly from site to site, which was probably due to winds blowing the reactive products and forming oxidants at one site. Other pollutants showed no significant differences.

When the values measured are compared with the data taken at the Bay Area Air Pollution Control District (BAAPCD) station on Alma Street, several general trends can be seen. Exact quantitative comparisons are difficult since the monitoring station reports data as high hourly averages, but qualitative trends can be discovered. Pollutants measured at the station include photochemical oxidants, carbon monoxide, nitrogen dioxide, and particulates. Oxidant is an indication of photochemical smog, and measurements taken in the foothills showed that the concentration was close to that measured downtown. Both carbon monoxide and nitrogen dioxide are indications of the extent of pollution from motor vehicles. Carbon monoxide is emitted directly from the vehicles, while nitrogen dioxide is a product of the reaction between nitric oxide from autos and oxidants. Both these pollutants were present in substantially lower concentrations in the foothills than downtown, due primarily to the smaller amount of auto traffic in these areas. Particulates are emitted from a variety of sources, with industrial particulates and fugitive dust being primary sources. It was found that particulate concentrations were somewhat lower in the foothills than downtown, again probably because of the lack of sources in the foothills.

The BAAPCD classified July 26 as a heavy air pollution day and August 20 as a light air pollution day. The only significant differences between the two days at the sites measured were oxidant readings; concentrations were substantially higher on the heavy air pollution day. There was no significant difference in other pollutant concentrations on the

two days, which indicates that, at present, oxidants are the only significant air pollution problem in the undeveloped portions of the eastern foothills.

Aerial monitoring of the area was carried out on July 24, 1973, to measure oxidants (to detect the presence of photochemical smog) and carbon monoxide (to detect the presence of primary pollutants from motor vehicles). The results showed that there was no significant horizontal gradient of oxidant over the basin -- in other words, at ground level, the East Zone experiences approximately the same concentrations as the downtown area. There were differences in carbon monoxide concentrations, which were slightly higher over the downtown area. This is to be expected, because of the greater auto traffic downtown.

The aerial monitoring did show significant vertical gradients, however, with oxidants reaching a maximum at approximately 1,500 feet and then dropping off at higher elevations. This is a typical feature of the basin, as oxidant concentration gradually increases from the ground up to the inversion layer (in this case 1,500 feet) and then drops off rapidly. Carbon monoxide concentrations also dropped off rapidly after passing through the inversion layer.

Previous studies done by URS Research Company have shown that oxidant concentrations do vary on the ground under north wind conditions. It was found in one case that concentrations were slightly higher in the southern Santa Clara Valley than in San Jose during north winds. The differences were not large, however.

In summary, oxidants are the only pollutant present in significant quantities at the sites measured in the eastern foothills. In more developed sites, primary pollutants from autos (carbon monoxide, oxides of nitrogen, and hydrocarbons) would also be a problem, but as of now these pollutants are not present in significant quantities even on heavy air pollution days.

Noise

Noise has variously been defined as "unwanted sound" or "sound without value." Both these definitions recognize that a degree of subjectivity is inherent in the definition of noise. However, this does not negate the fact that sound can and does affect the full range of human activity from sleeping to work.

There are various ways in which a sound environment can be described in physical terms, and physiological effects and responses can be predicted with varying degrees of accuracy. Physiological effects may vary from permanent hearing loss to temporary constriction of blood vessels, depending on the level and duration of sound. Thus the implications in terms of public health may vary from serious to minor. However, minor effects on health do not justify ignoring the effects of noise on the quality of life or the more subtle or indirect influences of noise on human behavior and performance.

Community response to environmental noise is influenced by collective and individual attitudes toward the sources of noise, and by beliefs as to whether anything can be done to reduce or eliminate the noise. Changes have occurred in the latter views as the public has come to understand that in many instances something can be done to abate or control environmental noise. It is the responsibility of public agencies to decide when and what should be done to control environmental noise. Further background information on the effects of noise and community response can be found in Appendix C.

The vast majority of developed land in the East Zone is in residential land use. The remainder is devoted to transportation (primarily streets and highways), commercial, industrial, agricultural land use, and other open space. Thus, except for specific areas such as locations near highways or industrial or commercial activities, the noise environment is

typical of residential areas. Exceptions also occur on the fringes of developed areas where the noise environment is representative of a rural or wilderness setting.

The dominant source of noise in the East Zone is vehicular traffic. Therefore the current noise environment tends to be pervasive and is strongly linked to the daily variation in traffic volume and to proximity to traffic arteries. The range of average daytime noise levels in various types of residential areas is given in Table III-12. Results of a noise survey conducted on 30 August 1973 are shown in Table III-13.* Where appropriate, the expected range of average noise levels from Table III-12 is entered in Table III-13 for residential areas. Results are generally within or below the expected range of noise levels. Generally, open space areas have noise environments characteristic of the land use bordering those areas, although noise levels are somewhat reduced.

The highest noise levels were found in the industrial area (74 dBA), commercial areas (62-65 dBA), and areas near major highways (58-68 dBA). The general trend of noise along creeks, as anticipated, is an increase in levels as one goes downstream. There are exceptions where creeks pass through commercial or industrial areas and then pass on to open space or parks, but in general this trend is consistent, as most of the current development in the East Zone is in the valley floor or along the western edge of the zone.

The lowest noise levels were found in the fringes of the urban area and along the foothills. Generally these noise levels varied between 35 dBA and 40 dBA. Noise from running streams at times was 5 dBA higher than the noise levels in the immediate vicinity of the stream bank.

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*A General Radio Model 1551C Noise Survey Meter was used, with needle on slow response. Decibels re $20 \mu N/m^2$, A-weighted.

Table III-12

QUALITATIVE DESCRIPTORS OF
URBAN AND SUBURBAN DETACHED HOUSING RESIDENTIAL AREAS
AND APPROXIMATE DAYTIME AVERAGE NOISE LEVEL

Description	Daytime Average Noise Level in dB(A)[a]	
	Typical Range	Average
Quiet Suburban Residential	41 - 45	43
Normal Suburban Residential	46 - 50	48
Urban Residential	51 - 55	53
Noisy Urban Residential	56 - 60	58
Very Noisy Urban Residential	61 - 65	63

a. Sound pressure level in decibels re 0.0002 microbar, A-weighting.

Source: Anon., Community Noise, National Technical Information Document 300.3, Springfield, Virginia, National Technical Information Service. Prepared for EPA by Wyle Laboratories, December 1971.

Table III-13

RESULTS OF NOISE SURVEY,
FLOOD CONTROL DISTRICT EAST ZONE

Site Number	Location	Land Use	Noise Levels (dBA) Expected	Measured
1	East Hedding and Old Bayshore, 200 feet west of depressed US 101	High-Density Residential	61-65	63
2	Stream bank at junction of Coyote and Penitencia Creeks, near industrial area at Berryessa Road	Floodplain	NA	59
3	Industrial area along Berryessa Road, between US 101 and Coyote Creek	Industrial	NA	74
4	Penitencia Creek 200 feet north of King Road	Agricultural	NA	47
5	Heatherfield, halfway to Helmsley Drive, easterly from Penitencia Creek Road	Medium-Density Residential	46-50	46
6	End of Doral Drive off Penitencia Creek Road, in foothills	Very Low Density Residential	41-45	39
7	Alum Rock Park, Mineral Springs Area	Recreation	NA	40-44
8	Altadena off Fleming south of Alum Rock Road	Very Low Density Residential	46-50	44
9	Santa Clara and South 20th	Commercial	NA	62
10	Alum Rock Road at King Road	Commercial	NA	65

Table III-13 (continued)

RESULTS OF NOISE SURVEY,
FLOOD CONTROL DISTRICT EAST ZONE

Number	Location	Land Use	Noise Levels (dBA) Expected	Noise Levels (dBA) Measured
11	Bermuda at Darwin, 0.4 mile west of Hillview Airport	Medium-Density Residential	46-50	50
12	San Felipe Road 0.6 mile south of The Villages Parkway	Floodplain-Agricultural	NA	35
13	Uridias off Piedmont Road, Milpitas, near Los Coches Creek	Agricultural	NA	52
14	Behind Milpitas City Hall, off Calaveras Boulevard	Floodplain	NA	51
15	Coyote Creek, 300 feet south of Milpitas-Alviso Road	Floodplain	NA	60
16	Entrance Road to Riverside Golf Course off Monterey Highway	Agricultural	NA	68 at 100 ft 58 at 400 ft
17	Riverside Golf Course Road at Coyote Creek	Floodplain	NA	55
18	Diversion Canal east of Riverside Golf Course	Recreational	NA	46
19	Ridgeline, Lake Anderson Dam	Recreational	NA	36

Source: URS Research Company Survey, August 30, 1973.

In summary, the current noise environment in the East Zone is consistent with existing land use. The lowest average noise level measured was 35 dBA in rural areas and the highest was 74 dBA in an industrial area. The average noise level in residential areas was approximately 48 dBA. The ranges of noise levels that occur along streams are given in Table III-14.

Table III-14

NOISE LEVELS ALONG STREAMS

Land Use Bordering Stream	Noise Level Range (dBA)
Rural/agricultural	35 - 45
Very low-density residential	40 - 45
Parks/recreation areas	40 - 45
Medium-density residential	45 - 50
Urban/agricultural	45 - 55
Major highway or arterial	55 - 65
Commercial	60 - 65
Industrial	65 - 75

Source: URS Research Company.

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C. Ecology

Ecosystems

Because the East Zone of the District covers a large area, there is a wide variety of ecological regions; these regions fall into seven habitat divisions. Photographs of these habitats are presented in Figures III-17 through III-23.

The wet riparian woodland habitat includes those sections of streams in which surface water is present throughout most of the summer and where natural vegetation has not been replaced or removed, although introduced species are usually present. Dominant trees and shrubs include willows, cottonwoods, sycamore, elderberry, and oaks. (See Appendix D for detailed species list.) Typical bird inhabitants of the wet riparian woodlands include the scrub jay, chestnut-backed chickadee, ash-throated flycatcher, Oregon junco, white-crowned sparrow, rufous-sided and brown towhees, acorn woodpecker, coot, ring-necked duck, and wood duck. Most toads, frogs and snakes listed in Appendix E can be found within the creek or pond woodlands. Several mammals, including the striped skunk, raccoon, broad-handed mole, trowbridge shrew, fox squirrel, Norway rat, and dusky-footed wood rat, occur there as well. Creek and pond waters, usually in conjunction with bottom riparian growth, support many invertebrates, including water striders, mosquitos, and midges. These insects are food for several small freshwater fish such as the three-spine stickleback and mosquitofish.

The dry riparian habitat describes areas where the creek is dry during part of the summer and where the vegetation is generally natural. This type of vegetative community is usually dominated by woody plants. Elderberry, buckeye, and live oak are characteristic. In the driest riparian habitats, herbaceous plants such as milk thistle and tall grasses are dominant. Frequently, the dry riparian habitat extends through the foothills,

Fig. III-17 WET RIPARIAN WOODLAND (Coyote Creek near Reach 36)

Fig. III-18 DRY RIPARIAN HABITAT (Yerba Buena Creek from Villa Vista Road)

where the limited watershed and quick runoff account for the dryness of the creek bed during the summer months. The Stellar jay, western meadowlark, western wood pewee, robin, lark sparrow, California thrasher, and wrentit are characteristic species of the dry riparian environment. Similarly, the spadefoot toad, California slender salamander, California horned lizard, California kingsnake, gopher snake, rattlesnake, ringtail cat, California pocket mouse, California ground squirrel, California vole, coyote, brush rabbit, and mule deer are representative fauna for this habitat.

Bottom riparian ecosystems usually occur in association with one of the previously described habitats. Typical bottom riparian vegetation is dominated by cattails, bulrushes, tall grasses, and sometimes umbrella sedge. Bottom growth is usually rich in shallow, slow-moving water where the riparian woodland is not too dense. In deeper water, bottom growth frequently occurs near the sides of the stream channel or pond banks. A community of terrestrial hydrophyllic plants is often present on the slopes just above the bottom riparian growth. This community is usually dominated by knotweed, spearmint, curly dock, and occasionally loosestrife and common monkey flower. Less productive bottom riparian communities are dominated by watercress and grasses. Cocklebur, curly dock, and grasses are the principal species covering dry creek beds. Red-winged and Brewer blackbirds, black phoebes, Virginia rails, Santa Cruz song sparrows, and savannah sparrows move in and around the lush bottom cover. Shovelers, common gallinules, pied-billed grebes, mallards, and pintails feed and find shelter in the waters of a bottom riparian community when these migrants are in the area. Practically all the amphibians listed in Appendix E are likely inhabitants of the bottom riparian. The opossum, raccoon, striped skunk, and black and Norway rats are expected mammal visitors to this habitat.

The baylands habitat includes estuarine waters, tidal mudflats, and their associated ponds, marshes, and existing levee and landfill areas. Cord grass and pickleweed represent the major marsh cover, while poison hemlock, saltbush, and anise flourish on the higher grounds. In the upstream estuarine environments, the banks are commonly covered with saltbush,

Fig. III-19 BOTTOM RIPARIAN HABITAT (Silver Creek Reach 34)

Fig. III-20 BAYLANDS - ESTUARY HABITAT
(Confluence of Lower Penitencia and Coyote Creek)

salt grass, knotweed, and alkali mallow, and the bottom riparian community is generally well developed. San Francisco bay waters and baylands support an extremely large number of visiting and resident bird species. The salt marsh and mudflat areas, in particular, are extremely productive, with large quantities of insects and marine invertebrates being significant sources of food for birds. The avocet, marbled godwit, American goldfinch, California gull, killdeer, western sandpiper, lesser scaup, barn swallow, cinnamon teal, willet, and long-billed marsh wren are just a few of the characteristic inhabitants of the baylands. A more comprehensive indication of the bird population in the baylands is given in Appendix E. Other typical bayland animals include the vagrant shrew, California vole, deer mouse, salt marsh harvest mouse, raccoon, blacktail jackrabbit, long-tailed weasel, gopher snake, and western fence lizard.

Waste fields and grasslands border many of the riparian habitats. Grasslands are uncultivated fields dominated by grasses such as wild oats. Scattered trees, usually live oaks, are sometimes present. Waste fields are either formerly cultivated fields and orchards or former natural terrestrial plant communities once cleared and allowed to become revegetated by weedy species. Star thistle, prickly lettuce, bindweed, mustard, and saltbush are important waste field species. Bindweed appears to be the earliest pioneer species in wastefields, while star thistle dominates the well-developed waste field communities. Common birds of the fields and grasslands include the mourning dove, house finch, California quail, plain titmouse, orange-crowned warbler, red-tailed hawk, and sparrow hawk. In addition, this habitat provides cover for most of the terrestrial fauna listed in Appendix E.

The agricultural habitat refers to orchards (usually dominated by walnut, prune, or apricot trees), vineyards and vegetable fields. The primary purpose of the agricultural designation is to describe habitat immediately adjacent to many of the creeks. Rarely are the creek banks void of nonagricultural plant life in an agricultural reach, but occasionally fields and orchards

Fig. III-21 WASTE FIELDS AND GRASSLANDS (Thistle and Teasel in Foreground. Coyote Creek near end of project)

Fig. III-22 AGRICULTURAL HABITAT (Upper Penitencia, Reach 5. Site of proposed realignment.)

are the primary vegetative cover. The agricultural habitat supports several bird species among which the Brewer and red-winged blackbirds, common crow, yellow-billed magpie, western meadowlark, cedar waxwing, and starling predominate. The western toad, coast garter snake, dusky-footed woodrat, California vole, raccoon, and coyote are also typical inhabitants or visitors.

Developed urban land includes residential, industrial, and commercial areas, as well as roads and other facilities. The vegetation here is often minimal, consisting of introduced plants, either cultivated or escaped, and some native plants such as sycamore and California walnut, which are often reintroduced. Bottom riparian vegetation is occasionally present in drainage structures. The scrub jay, acorn woodpecker, rock dove, house finch, western bluebird, golden-crowned sparrow, white-crowned sparrow, violet-green sparrow, Bullock's oriole, mockingbird, robin, and Anna's hummingbird are a few typical "backyard" bird species. Similarly, the botta pocket gopher, house mouse, black rat, California ground squirrel, mule deer, bullfrog, Pacific tree frog, western skink, and gopher snake may be found in an urban habitat, providing it is not an extremely developed area.

All seven of these habitats fall within a region that is basically homogenous with respect to the climatological parameters. Consequently, the preceding divisions are not always strictly defined, and considerable overlap exists. Similarly, variation from one side of a creek to the other is a common feature. These factors must be considered when attempting to determine the floral and faunal species of a particular reach.

Fig. III-23 DEVELOPED URBAN HABITAT (Berryessa Creek)

Flora

The following descriptions of the flora in the East Zone are to be used in conjunction with the "Map and General Plan" (see Detailed Project Description). Wherever possible, an attempt was made to describe locations in relation to physical landmarks such as streets or stream confluences with other creeks. Where no such landmarks were available, notations were made according to reach or station numbers as indicated on the map and general plans.

Plant communities have been delineated according to the descriptions in the ecosystems section. Where the community deviates from those descriptions, or where elaboration is needed, additional information is included. A detailed listing of plants found in the project area is presented in Appendix D.

Endangered Plant Species

Twelve plant species are included in the Santa Clara County listings in the "Inventory of Rare, Endangered, and Possibly Extinct Plants of California," prepared by the California Native Plant Society.[1] Three of these species have been reported from locations in or near the area included in this project, although none were actually seen in the field work.

Plagiobothrys glaber (glabrous popcorn flower) is a species of the salt marsh and alkaline flats and is probably already extinct. *Cirsium campylon* (Hamilton thistle) has been reported near the Coyote percolation basin near Metcalf Road. *Ceanothus ferrisae* (Ferris' ceanothus) is found in the Anderson Dam area, but none was found in the area included in this project.

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1. For numbered references see list at end of Section IIIC.

An additional rare species, Salsola soda, is found only in the South San Francisco baylands and in Russia, according to Art Ogilvie of the Santa Clara County Planning Department.

Plant names are according to Munz,[2/] and locations are according to the Santa Clara County Plan for the Conservation of Resources.[3/]

Coyote Creek

The habitat of Coyote Creek where it flows into the bay is a mudflat, with only algae as vegetation. Upstream, to approximately Dixon Landing Road, the habitat is salt marsh. The principal marsh species are cord grass and pickleweed. Pickleweed is present on the levees, also, but slightly less salt-tolerant plants, which cannot survive submersion in salt water, are there as well. Such plants include Australian salt bush and alkali heath. Vegetation becomes gradually less halophilic upstream, and pickleweed is mostly replaced by the less salt-tolerant species near the Fremont Airport. Tree tobacco is moderately common on the levees upstream from the airport. The creek supports a very dense bottom riparian community, beginning downstream and extending almost to the mudflats. Cattail and alkali bulrush are the principal species on the lower slopes; above the bottom riparian growth is a plant community dominated by knotweed (Polygonum), curly dock, and fat-hen saltbush.

From Dixon Landing Road to the Milpitas Sanitary District treatment plant, the bottom riparian and lower slope communities are not noticeably different from those downstream. Along the creek banks and on the levees is a riparian community that is unlike typical wet or dry riparian communities, due to the high salinity. Most of the plants are herbaceous, and include poison hemlock, milk thistle, anise, saltbush, alkali heath, and heliotrope, and pickleweed is still occasionally found there. Woody plants are scattered, and include willow, tree tobacco, cottonwood, elderberry, and blackberry. Bordering land is mostly waste field dominated by poison hemlock.

Upstream from the treatment plant begins a transition from estuary to normal wet riparian habitat. Box elder is the dominant tree in this transitional habitat. Several eucalyptus trees and a few pear trees have been planted. Occasional cottonwood and walnut trees grow here. Willow is the most common shrub, with wild rose, elderberry, and tree tobacco moderately well represented. Herbaceous plants are still halophytes, such as salt grass and alkali heath. The bordering waste fields are dominated by poison hemlock. Bottom riparian growth covers only the sides of the creek bottom, but appears to be composed of the same species as occur downstream. Knotweed (Polygonum) is common at the water's edge.

From approximately station 220 (see Map and General Plan) to the South Bay Freeway, box elder remains the dominant riparian species, but cottonwood becomes more common. Surrounding land is pear orchards; existing and proposed levees traverse these orchards.

From the freeway to Trimble Road the wet riparian habitat is similar to that described above, but sycamores are occasionally found, elderberry is more common, and cottonwood is co-dominant with box elder. The halophytes have been mostly replaced by such riparian herbs as cocklebur and horehound. Tall bottom-riparian plants, such as cattails and bulrushes, are found only in occasional patches. Knotweed remains common near the water's edge. Near Trimble Road the bottom riparian growth is lusher; the slopes of the creek bank support a dense and diverse plant community dominated by knotweed and blackberry, and including poison hemlock, horehound, sagebrush, elderberry, curly dock, anise, and cocklebur.

From Trimble Road to Nimitz Freeway most of the land is industrial and the rest is waste fields. Development (now in progress) has resulted in removal of most of the terrestrial wet riparian vegetation, leaving unvegetated and sparsely vegetated areas. The remaining native trees are mostly box elder and cottonwood, with occasional walnut and sycamore trees. Eucalyptus, elm, and locust trees have been introduced. Bottom riparian growth is dense near Trimble Road but gradually diminishes toward Nimitz Freeway.

Between Nimitz Freeway and Oakland Road is wet riparian woodland along the creek, with industry and waste fields to the east and a road to the west. Box elder and cottonwood continue to dominate the riparian woodland. Sycamore, willow, elderberry, and elm are also significant trees and shrubs. Bottom riparian growth is sparse, and is composed mainly of knotweed.

From Oakland Road to the Silver Creek confluence the wet riparian woodland is similar to that of the previous reach. The surrounding environment includes waste fields, agriculture, industry, a golf course, and a trailer court. Developments have disturbed the natural riparian community at intermittent locations. Bottom riparian growth is also intermittent.

From the Silver Creek confluence to Story Road the creek, with its wet riparian woodland community, passes mainly through a developed urban area. Some agricultural and waste fields are also found in this area. Box elder is mostly replaced by cottonwood. Oak and sycamore are also common.

From Story Road to the end of the project area the wet riparian community is essentially as described in the section on ecosystems. Adjacent habitat is mainly agricultural and wasteland, with occasional developed urban areas. Just downstream from Capitol Expressway is an extensive stand of cottonwoods. From Story Road to Hellyer Avenue the wet riparian community is represented by an unusually wide band of vegetation on both sides of the creek.

From Hellyer Avenue to Fontanoso Avenue the creek banks are steep and tree cover is dense. Construction of an access road has disturbed the riparian community near Fontanoso Avenue. Between Fontanoso Avenue and Tennant Road are several attractive percolation ponds, with vegetation essentially the same as wet riparian. Just upstream of Tennant Road the creek is very wide and pondlike, with cottonwoods dominant and other wet

riparian species common. Bottom riparian vegetation, mainly cattails and watercress, is present on scattered islands. Willow and mulefat (Baccharis viminea) are important subdominant species. From the pond to Metcalf Road the creek is between a quarry without vegetation and a levee with shrubby, wet riparian species, especially willow, mulefat, sagebrush, and elderberry.

Upstream from Metcalf Road to the proposed Bailey Avenue crossing vegetation is sparse and has been partially replaced by a parking lot as far as the PG&E substation. Past the substation walnut is the dominant tree species. Most of the plant community consists of large shrubs and small trees to Clayton Road (station 1415 on the General Plan), where the wet riparian community becomes progressively richer toward Bailey Avenue. A very lush, wet riparian woodland is located about halfway between Clayton and Bailey.

Between Bailey Avenue and Ogier Avenue dense, tree-dominated wet riparian woodland is mixed with shrub-dominated stands, waste fields, and grassland. Shrub cover is extremely dense in some areas near Ogier Avenue; construction is taking place in this area, however, and vegetation is in the process of being removed.

From Ogier Avenue to the end of the project area the wet riparian woodland community is dense and diversified, mostly dominated by sycamore, oak, and cottonwood trees. California bay, California walnut, maple, box elder, and alder are common. Willow and elderberry are the most common shrubs, with willow sometimes forming dense mats across the width of the creek. Blackberry, poison oak, toyon, buckeye, mulefat, and coyote brush are other shrubs found frequently. The trees and shrubs are occasionally replaced by grassland. Bottom riparian growth is intermittent (usually along the sides of the creek, but sometimes on islands where the creek is widest) and includes tall species, such as cattails, bulrushes, and umbrella sedge, as well as low-growing plants such as knotweed. Giant reed is fairly common near the water's edge.

Fisher Creek

Fisher Creek and its right-of-way pass almost entirely through agricultural land and waste fields. The riparian community is poorly developed, except for bottom growth. Most of the cultivated land is planted in prune and walnut orchards, with some tomato and squash fields; there is also some grazing land. The bottom riparian community is generally prolific upstream to the bend in the creek between Fisher and Richmond Avenues. Cattails and bulrushes dominate in the areas of heavy bottom growth, while watercress and knotweed dominate the sparser bottom growth. In addition to the agricultural species, the most common bank species include anise, milk thistle, poison hemlock, willows, curly dock, cocklebur, and elderberry.

Just downstream from Bailey Avenue, within the proposed low-flow channel right-of-way, is a marshy area supporting oaks, walnuts, and cottonwoods.

A dry riparian community dominated by willows with a few large oaks begins downstream of Bailey Avenue and follows the creek around Spreckles Hill. The hill is covered with grassland with a few scattered oaks. Additional oaks and willows are located between Fisher and Richmond Avenues, just upstream of the bottom riparian community. Another significant dry riparian community begins just downstream of Kalana Avenue and continues upstream to the second crossing of Santa Teresa Expressway; oak and elderberry are dominant here. Several cottonwoods are located along the present creek upstream of Live Oak Avenue on the Supnet property. Eucalyptus trees line the creek from Madrone Avenue to approximately 800 feet downstream.

Silver Creek

From its confluence with Coyote Creek to Capitol Expressway, Silver Creek is mostly in a residential environment, with some small industry and agriculture. At the confluence with Coyote Creek is a wet riparian community dominated by cottonwoods. Walnut and box elder trees are also present.

Cocklebur and curly dock are the most common of the herbaceous plants. The bottom riparian community is also well developed. Principal plants are a large sedge, two species of cattails, and umbrella sedge.

Upstream the wet riparian woodland disappears and is represented only occasionally by cottonwoods or willows. The bottom riparian continues, with some interruptions, to the end of the project area.

The banks and right-of-way remain vegetated, but most of the plants are species normally found in developed or disturbed areas, such as coyote bush, Australian salt bush, milk thistle, poison hemlock, anise, radish, and mustard. Some native plants, such as wild rose, elderberry, blackberry, and sagebrush are also present. Tree tobacco is occasionally found.

Near the confluence with Coyote Creek are several large cottonwoods, box elders, and walnuts, but all are probably downstream of the proposed lined channel. Some small cottonwoods and willows may be removed. There are several fairly large cottonwoods just downstream of Capitol Expressway. Most of the trees indicated on the "Map and General Plan" that would be within the right-of-way have already been removed.

From approximately 450 feet upstream of Alum Rock Foods to just upstream of Lausett Avenue the channel is already concrete-lined, but it is able to support a bottom riparian community almost as rich as that in the unlined channel.

From Capitol Expressway to Ocala Avenue, Silver Creek is residential, and from Ocala to King Road the land is mostly undeveloped waste fields with some fields still under cultivation. There is a noticeable decrease in bottom and terrestrial vegetation in the right-of-way from Capitol Expressway to Story Road. Past Story Road bottom riparian cover is moderate

and beginning near the Soares-Lawrence property line it is dense as far as Ocala Avenue.

Just upstream from Tract 1410 are three medium-sized walnut trees approximately on the boundary of the present and proposed rights-of-way. Just downstream of Murtha Drive are three more walnut trees. Upstream of the confluence with Babb Creek are several small apricot trees and some cottonwood and walnut trees are located slightly farther upstream.

Downstream from Cunningham Avenue are four large patches of cattails. Cattails are also dense around the curve beginning approximately 200 feet upstream of Cunningham Avenue.

From Ocala Avenue upstream the vegetation is that of agricultural and waste fields. Milkweed, spike weed, Australian saltbush, anise, alkali mallow, and curly dock are most common of the weedy species. Cottonwoods, willows, and elderberry represent what remains of the natural riparian community. The bottom riparian growth is mostly good in this portion of the creek. Cattail is usually dominant but in some areas umbrella sedge is more common.

Thompson Creek

From the beginning of the project area to Quimby Road the bottom riparian community is very well developed, with cattails, bulrushes, and grasses. The entire width of the creek bottom is vegetated. Above the creek bed the right-of-way is very sparsely vegetated, with occasional bindweed and Australian saltbush. To the east of the right-of-way is an orchard with prune and apricot trees. To the west is Capitol Expressway, with no vegetation.

From Quimby Road to Aborn Road the surrounding habitat of Thompson Creek is mixed residential, agricultural, and waste fields. The principal agricultural species are prune, apricot, and walnut. From Quimby approximately to Everdale Drive the riparian vegetation is mostly herbaceous, including mustard, California poppy, giant reed, coyote brush, teasel, and milk thistle. From Everdale Drive to Aborn Road the immediate riparian environment is more natural and includes such typical wet riparian woodland species as cottonwood, California walnut, sycamore, live oak, elderberry, coyote brush, and blackberry.

From Aborn Road to the end of the project area the immediate environmental setting is transitional between wet and dry riparian woodland. Most of the land away from the creek is agricultural, with occasional housing developments and waste fields. Dominant species in this riparian woodland are live oak, willow, and elderberry. Valley oak and cottonwood are quite common.

Yerba Buena Creek

The immediate environment of Yerba Buena Creek throughout most of the project is dry riparian woodland, dominated by live oak (including many large trees of this species). Other important species are coyote bush, poison oak, blackberry, buckeye, elderberry, and cattail. In some places bottom growth of cattails, bulrushes, and tall grasses is heavy. Beyond Villa Vista Road the vegetation is drier than it is downstream. Live oak is still dominant but trees are fewer and most of the herbaceous vegetation consists of dry grasses. Some California bay trees are present here. Beyond the narrow bank of dry riparian woodland on both sides are agricultural and residential areas.

Evergreen Creek

This reach includes a portion of Evergreen Creek where the channel is very poorly defined from the confluence with Thompson Creek to about 1,000 feet downstream of the Poigal property line. The land is all agricultural, including apricot, prune, and walnut orchards and vineyards. No riparian vegetation is present.

Upstream the creek is better defined and supports a typical dry riparian community, with live oak, elderberry, and buckeye dominant and California bay fairly common. Adjacent land is agricultural interspersed with some waste fields.

Fowler Creek

From its confluence with Thompson Creek to the downstream end of the existing creek channel near the western boundary of the Edwards property, the planned Fowler Creek flood control improvements will cross vineyards and apricot, prune, and walnut orchards. Some of the orchards have already been cleared of trees so that the habitat has been converted to waste fields. Consequently, there is no existing channel and therefore no hydrophylic plants. The south branch improvement will run across a field and across apricot and walnut orchards to the proposed debris basin. The northern debris basin and dam will be located in a dry riparian plant community that is dominated by valley oak. There is one large oak in the center of the proposed dam, one just downstream, and a few within the area to be fenced. One or two of these oaks may be within the borders of the debris basin itself.

The southern debris basin and dam are to be located at the downstream end of a dry riparian habitat. Most of the debris basin is to be located on land that is now agricultural, with trees that are cultivated species of walnut. The fence will extend into the dry riparian ecosystem and a few valley oaks are within the area to be fenced (one or two may be within the debris basin). There are no trees within the proposed dam location.

Quimby Creek

From Thompson Creek to the mushroom farm the proposed Quimby Creek flood control improvements will cross apricot, prune, and walnut orchards, vineyards, and vacant fields. There is no discrete channel and no riparian community at the present time. The planned debris basin includes only a small amount of dry riparian vegetation. Most of the area where the debris basin is to be is already cleared and is waste field habitat.

The channel diverting the flow from the northern branch of the creek into the debris basin will cross agricultural land. The existing natural channel supports a typical dry riparian flora of elderberry, buckeye, willow, and oak.

Ruby Creek

The route of the Ruby Creek flood control improvements will cross a field from Silver Creek and then follow Tully Road through fields, residential areas, and orchards to Ruby Avenue. East of Ruby Avenue a pipe will continue south through an orchard. The debris basin and dam will be mostly located in the orchard but will continue into the field to the north, which is mostly grassland.

Flint Creek

From the confluence with Silver Creek to approximately 100 feet downstream of Flint Avenue there is presently no channel where the Flint Creek improvements are to take place. The right-of-way is through waste fields, cultivated grassland, a walnut orchard, and along the Pleasant Hills Golf Course. Some introduced pines, eucalyptus, and junipers adjacent to the golf course are to remain. There is no riparian community.

From 100 feet downstream of Flint Avenue to Mt. Pleasant Road the channel is intermittent and passes by a school and agricultural land. A very dry riparian community is supported along the channel, with a few walnut trees, one fig tree, and some elderberry, but milk thistle is the dominant species through most of this reach. Dry bottom riparian species such as cocklebur and curly dock are common near Flint Avenue, but decrease upstream. The alternative alignment passes through agricultural land.

Upstream from Mt. Pleasant Avenue the creek passes through a vineyard and a walnut orchard. The dry riparian woodland community is dominated by walnut and Coast live oak. There are several large live oaks along the creek to the end of the project, and in the proposed debris basin. Several valley oaks are included in the debris basin as well.

South Babb Creek

From the Silver Creek confluence to Clayton Road, South Babb Creek is located in a residential area with almost no terrestrial riparian vegetation. Bottom riparian growth, when present, is limited to grasses and low, semiaquatic plants. In reach 8 there are a few walnut, cottonwood, and alder trees and cultivated shrubs.

The section that follows Clayton Road is still in a residential area, but is less developed. The native vegetation has been partially replaced by cultivated species, especially ice plant, but some elements of the dry riparian woodland community, such as walnut and blackberry, remain. The landscaping is mostly aesthetically pleasing even when it is unnatural.

Upstream of Clayton Road the habitat consists of dry riparian woodland bounded by agricultural land, mostly walnut orchards, on both sides. From station 71.5 to 80.5 is a housing development on the north side of the creek, which has eliminated much of the natural vegetation. Dominant species of the dry riparian woodland community in this area are willow, elderberry, live oak, and walnut.

North Babb Creek

The surrounding habitat of North Babb Creek is residential. The bottom riparian community is mostly dense throughout the area to be improved. Most of the plants on the banks are introduced species except for some small cottonwood and walnut trees. The large cottonwood at station 10.4 is not in the right-of-way, and the tree indicated on the Map and General Plan at station 12.6 is no longer there.

Upper Penitencia Creek

Dry riparian woodland borders Upper Penitencia Creek throughout most of the length of the project; in some areas, the habitat tends to nearly wet riparian. From its confluence with Coyote Creek to the bend just beyond the Western Pacific Railroad tracks, box elder and cottonwood are the dominant species, with elderberry, willow, and poison oak also very common. The area between Berryessa Road and the flea market has been landscaped and many cultivated plants are mixed among the native species. Bottom riparian growth is thick near the confluence but sparse upstream. The proposed realignment from Coyote Creek to just beyond King Road is through agricultural land. Walnut trees and a row of shrubs are located where the maintenance road is planned.

From the bend to just beyond King Road the natural channel is in an agricultural area, with several rural residences and greenhouses near the creek. Box elder is only occasional here, with cottonwood retaining its dominance. California and English walnut and willow are very common. Cultivated plants and blackberries are found near the residences. A few redwood trees have been planted. Periwinkle and ivy form a ground cover near the residences downstream of King Road. The creek banks are heavily eroded and soil has been removed from much of the root systems of several walnut trees. These trees will fall into the creek if the soil is not replaced.

From King Road to about 700 feet downstream of the Sinclair Freeway crossing, the riparian woodland is mostly dominated by walnut, but with some chaparral-like areas, dominated by shrubs. Surrounding land use is mostly agricultural and waste fields. The dry riparian woodland ends about 700 feet downstream of Sinclair Freeway, and vegetation consists of agricultural and weedy species. The freeway crossing is presently under construction and is devoid of any vegetation. From the freeway crossing to Capitol Avenue the area is developed urban, which has resulted in removal of much of the natural vegetation, except for a large, very attractive valley oak and a few large sycamores.

From Capitol Avenue to Piedmont Road a transitional wet-to-dry riparian woodland community lines the creek banks, while the adjacent land is planted with vineyards and orchards (however, some of the orchards indicated on the Map and General Plan have already been converted to waste fields). The riparian community is diversified, with many sycamore, walnut, and live oak trees intermixed with areas dominated by willow, elderberry, and mulefat. Bottom riparian growth is found in occasional patches.

From Piedmont Road to Tallent Drive is a developed urban area. To Gridley Street the creek banks are fairly well landscaped. Beyond Gridley the tract homes have caused more disturbance to the riparian community, although many wet and dry riparian species remain. Sycamore is dominant and valley oak is very common. Eucalyptus has been introduced, and is dominant between Linda Vista and Toyon Avenues. Occasional live oak and big-leaf maples and cottonwoods are also present. Principal shrubs are willow, mulefat, coyote bush, and blackberry.

From Tallent Drive to the end of the project the land is less developed. Principal species are mainly the same as downstream, except that there are additional shrub species -- toyon and buckeye are found here. Natural vegetative cover is more complete here than downstream.

Berryessa Creek

Berryessa Creek is estuarian from its confluence with Lower Penitencia Creek to near the first housing development. The bottom riparian community is very rich, dominated by cattails and bulrushes. Spearmint, curly dock, and loosestrife dominate the community on the lower slopes of the creek bank. Principal terrestrial species are alkali mallow, alkali heath, salt grass, saltbush, and poison hemlock. Occasional cottonwood and box elder trees are present.

The diversion crosses mostly uncultivated grasslands until it rejoins the natural channel. The existing channel supports a rich bottom riparian community.

From just downstream of the Tularcitos Creek confluence to Landess Avenue, Berryessa Creek flows mainly through waste fields. Bottom riparian growth is generally well developed, with cattails, bulrush, and umbrella sedge. Knotweed, spearmint, and loosestrife are found on the lower slopes of the creek just above the bottom growth. Terrestrial vegetation is mostly typical of waste fields, and includes grasses, star thistle, bindweed, milk thistle, and anise. Trees and shrubs are sparse, but include willow, cottonwood, and walnut. Between Piedmont Creek and Ames Avenue are several valley oak trees, but they are not within the area to be improved. There is a large onion field along much of the western side of the creek.

From Landess Avenue to the end of the project are industrial, residential, and commercial developed urban areas and waste fields. The Sinclair Freeway is in construction here; from Landess Avenue to the freeway construction, bottom riparian growth is generally dense but terrestrial vegetation is sparse. Even the section of channel that is already concrete (the first curve past Landess Avenue) supports a fairly dense bottom riparian community. There is

a small stand of willows just before the freeway construction. The construction area is completely devoid of plant life. Upstream of the freeway construction is an earth channel in a residential area, with very little creek vegetation as far as Cropley Avenue. A few small cottonwoods remain and occasional Australian salt bush and coyote brush plants have grown since the creek and banks were cleared of vegetation. Some willow and anise are found near Cropley Avenue.

Upstream of Cropley Avenue the bottom riparian community is dense. The planned diversion is to come very close to a large cottonwood tree just south of Cropley Avenue.

From Morrill Road upstream the terrestrial riparian habitat gradually becomes less disturbed. Typical dry riparian species such as coyote brush and elderberry become evident. Eucalyptus is fairly common, as well. Beyond Messina Drive, riparian woodland species, especially sycamore and cottonwood, become dominant. Willow, California walnut, eucalyptus, California bay, and buckeye are also significant species from Messina Drive to the end of the project. Upstream of Messina Drive on the southern bank of the creek is a picnic area with mostly native plant species.

Arroyo de los Coches Creek

The section from Berryessa Creek to Evans Road (not on the Map and General Plan but approximately at station 61.5) is mostly residential, industrial, and commercial, with a small amount of agriculture and waste field. The northern bank from the beginning of the project to the freeway crossing is an undeveloped waste field dominated by star thistle. Construction of the freeway crossing has eliminated all creek vegetation, but the banks of the creek crossing have been landscaped. The bottom riparian community is dense, especially near the beginning of the project, and is

dominated by cattail, knotweed, and watercress. Some rooted aquatic plants are included in the existing concrete channel near Evans Road. Terrestrial riparian plants are sparse. Blackberry, anise, cottonwood, and saltbush are the principal species.

From Evans Road to the end of the project the general habitat is agricultural, with walnut orchards and grazing land. A wet riparian community is intermittent. Sycamore is the most common native tree here; native and cultivated walnut trees, willow, poison oak, and blackberry are the other principal woody plants along this part of the creek. Bottom riparian vegetation is scarce, and is limited mainly to watercress, except in the sediment control facility location, where cattails are moderately abundant. Spearmint, loosestrife, horehound and curly dock form a moderately dense plant community at the edge of the water. The sediment control facility site is surrounded by several attractive sycamores and a dense stand of willows is located at the upstream end of the project.

Calera Creek

Reach 1 of Calera Creek is through an industrial area. Industrialization has eliminated most of the native plant species on the banks, but a few small cottonwoods and one small willow remain. The bottom riparian community is fairly dense, dominated by umbrella sedge, bulrushes, and watercress. Several eucalyptus trees are included in the right-of-way.

From North Main Street to Escuela Parkway the creek and right-of-way pass through waste fields dominated by star thistle. From stations 25 to 29, East Side High School is to the north and the field continues on the south. A walnut orchard replaces the waste field at station 29. The common plants on the banks of the creek include poison hemlock, Australian saltbush, anise, cocklebur, and thistle. The only trees within the right-of-way are a few small alders and willows. There is a single buckeye tree in the right-of-way at Main Street. The bottom riparian community is intermittent, sometimes dominated by cattails and umbrella sedge and sometimes by watercress.

From Escuela Parkway to the end of the project the habitat is urban, with the portion nearest the freeway undeveloped. The orchards indicated on the Map and General Plan are no longer there. To the west is a school and to the east are residences. The dominant plants in the right-of-way are willow, box elder, and walnut.

Reach 6 on the General Plan is the freeway crossing. Existing flood control structures have replaced the vegetation. The habitat of reach 7 is intermediate between wet and dry riparian woodland immediately adjacent to the creek, with bordering agricultural land. Two rows of olive trees have been planted just east of the natural riparian community. Most of the trees of the orchard indicated on the Map and General Plan are gone. This woodland community is dominated by box elder, walnut, and sycamore.

Lower Penitencia Creek

From its confluence with Coyote Creek to just beyond the confluence with Berryessa Creek, Lower Penitencia Creek is in marshlike estuarian habitat. The bottom riparian ecosystem is extremely rich. Cattails and bulrushes dominate the bottom growth. Above the cattails and bulrushes, on the lower slopes of the creek banks, is a band of vegetation dominated by knotweed. The levees are dominated by salt grass, Australian saltbush, alkali heath, and alkali mallow. From the levees to the limits of the right-of-way are fields dominated by Australian saltbush, anise, poison hemlock, and milk thistle.

From just upstream of the confluence with Berryessa Creek to Spence Avenue is mostly residential, with some light industry and open fields downstream from Redwood Avenue. The natural plant community has mostly been removed in development. The bottom riparian is sparsest downstream of Redwood Avenue; it then improves slightly and is dominated by bulrushes, with cattails appearing farther upstream. Vegetation is composed mainly of cultivated plants, but a few native walnut and sycamore trees are present,

as well as wild rose. The most common plants within the right-of-way are heliotrope, saltbush, alkali mallow, and bindweed.

From Capitol Avenue to Montague Expressway the channel follows the railroad track through uncultivated fields and light industrial areas. The extremely dry riparian community is dominated by wild oats and milk thistle.

Penitencia East Channel

The Penitencia East Channel will cross waste fields to the Montague Expressway. Salt bush, Canada thistle, milk thistle, and star thistle are the principal plants. Beyond Montague Expressway is a dry creek bed extending approximately 600 feet. The vegetation of the surrounding field is similar to the downstream portion, but cocklebur and curly dock are common in the creek bed. The last 1,100 feet of channel will cross the Santo property, which is presently cultivated.

Fauna

The diversity of faunal species in the area corresponds to the variability of the plant communities. With the seven habitat divisions, the distribution of wildlife within the project can be discussed without making references to specific locations, which could be misleading.

Most of the animals can be found in more than one habitat, and several are found in all seven habitats. Birds, in particular, are extremely mobile; countless numbers migrate to or through the Bay Area via the Pacific Flyway each year. Seasonal wildlife literature accounts supplement summer field observations and make it possible to extrapolate for all four seasons.

The faunal species list, Appendix E, represents possible wildlife distribution within the project. Distribution fluctuations are dependent upon annual variations in physical parameters, such as rainfall and temperature, and on man's disruptive inputs (such as construction noise). For example, the URS field observations in August of 1973, an extremely wet year, may not correspond exactly to field observations of previous or following years. In addition, normal movements by certain species within the project area can be expected throughout the year. Thus during the spring a bird may be found in a reach described as dry riparian even though the bird's usual habitat is wet riparian. Obviously, the dry riparian environment during the wet months has attained enough wet riparian characteristics to enable the bird to extend its range. The wet and dry season subclassifications within the dry riparian division help compensate for such movement. Since some birds are found in the area only during the wet months, a degree of seasonality will be reflected in the dry riparian column as well. Despite the fluctuations, however, the animal-habitat associations described in this study generally are indicative of actual population distributions.

Fauna-habitat associations are not given for the freshwater invertebrates listed in Table E-5. In general, these invertebrates are most prominent in the bottom riparian reaches of the creeks. Throughout these areas

of available surface water, larval and adult insects and miscellaneous invertebrates can be found living in or on the mud, submerged sticks, other debris, plant stems, channel crevices, and openings and cracks of surface and submerged rocks. Since the eggs, larval, and/or pupal stages of several insects (e.g., chironomids, caddisflies, dragonflies, and beetles) are fully aquatic, the freshwater insect population, including the aquatic adult species, serves as a significant food source for fish, amphibians, and birds.

Several animals that occur in the project area deserve special recognition. The California clapper rail, the California least tern, and red-bellied harvest mouse are "endangered" species known to occur in the Coyote Creek marsh area. The California Department of Fish and Game (January, 1972)[4/] has classified these species as "endangered" because their "prospects of survival and reproduction are in immediate jeopardy." The U.S. Department of the Interior (March 1973)[5/] refers to these endangered species as "threatened," a term which is clarified thus in the Endangered Species Conservation Act of 1969:

> "A species of native fish and wildlife shall be regarded as threatened with extinction whenever the Secretary of the Interior finds, after consultation with the affected states, that its existence is endangered because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of overexploitation, disease, predation, or because of other factors, and that its survival requires assistance."

The endangered status protects the animals from being hunted or collected but not from accidental destruction (e.g., because of construction damage to their habitats).

The California clapper rail (Rallus longirostris obsoletus) resides and nests in the San Francisco Bay salt marshes, particularly along the edges of small sloughs and tidal meanders. According to Gill (1971),[6/] although the Coyote Creek marsh area is not a primary clapper rail habitat (pure stands of cord grass), it is a secondary one (pure stands of pickleweed or a cord grass

and pickleweed combination). As for most of the endangered marsh species, with the clapper rail the problem is more one of a diminishing habitat than of reproductive success. Bay fill and drainage, along with industrial pollution, are the major contributors to the clapper rail's diminishing habitat and subsequent population decline.

The California least tern (Sterna albifrons browni), smallest of the terns, is a summer visitor to the Bay Area. Although the least tern usually nests along the coastal sandy beaches, some 85 to 105 least terns nested in South San Francisco Bay in 1971.[6/]

The southern baylands are the only place in the world where the red-bellied harvest mouse (Reithrodontomys raviventris) still exists. The dense pickleweed of the higher mud flats provides the harvest mouse with food, while the dry grasses of the higher tidal zone are used for nests. As long as the pickleweed and undisturbed nesting sites remain, the red-bellied harvest mouse will survive. The habitat of the animal, however, is endangered. Bay fill and diking have contributed much to the decline of this subspecies.

The California black rail and the Alameda striped racer are listed as "rare" in the 1972 Department of Fish and Game report on California's endangered and rare fish and wildlife. A rare animal is defined in the Fish and Game code (Chapter 1.5) as one which "may become endangered if its present environment worsens." In addition, according to the 1973 U.S. Department of the Interior report, the black rail is "threatened."

The California black rail (Laterallus jamaicensis coturniculus) is a very secretive bird of the salt and freshwater marshes. Alkali bulrush and saltgrass are favorite black rail habitats. As with most of the special status animals, the black rail is in trouble because tidal marsh filling, draining, and channelization control are reducing its habitat.

The Alameda striped racer (Masticophis lateralis euryxanthus) is found in the valleys, foothills, and low mountains of the East Bay. Because of the habitat similarities between the grasslands and open woods in Alameda County and those in the project area, it is possible that the Alameda striped racer does occur within the project limits. Construction and development have greatly reduced much of the snake's habitat in recent years.

The "unique" status describes those animals of restricted distribution or low numbers in the area that are not officially protected by government agencies. According to a Santa Clara County Planning Department report,[3/] the white-tailed kite, saltmarsh song sparrow, and vagrant shrew are being considered for placement on the endangered list in the Department of the Interior's "Redbook of Rare and Endangered Species." In addition, the red-legged frog and the Sacramento perch deserve special attention.

The white-tailed kite population in the San Francisco Bay region, once extremely large, neared extinction in the 1930s. During the past few decades, however, the kites have made a substantial comeback. Nevertheless, the white-tailed kite does not migrate, and disturbance of their nests or open field and marsh foraging grounds conceivably could reverse the comeback trend.

The saltmarsh song sparrow (subspecies pusillula) is native to the salt marshes of the southern part of the bay. During URS field work, several saltmarsh song sparrows were observed among the cord grass stands bordering Coyote Creek. The vagrant shrew lives on wet ground under the marsh cover (e.g., pickleweed), inhabiting much the same area as the red-bellied harvest mouse. Consequently, the vagrant shrew, along with the saltmarsh song sparrow, is unique because of the diminishing marsh habitat.

The red-legged frog, which is protected (may not be taken or possessed) by the 1973 California Fish and Game Sport Fishing Regulations, may inhabit the pools, channels, and ponds along the wet riparian reaches in the project.

The Sacramento perch population, once abundant, has declined because of importation of exotic species. It is found in Coyote Creek, though infrequently, as well as in the sloughs and slow-flowing channels of the Sacramento-San Joaquin system. This perch is the only native fish of its family found in California.

Though many uncommon birds, such as the golden eagle, exist in the project area, their survival here is not considered to be critical. Nevertheless, all hawks, eagles, vultures, and owls are protected under the International Migratory Fowl agreements with Mexico. Thus their kill or capture is regulated in a manner similar to the present migratory duck regulations.

Birds in the area which may be of some concern in the near future appear on the 1973 Audubon Blue List.[7/] The Blue List is "a list of those species more common and often more widespread which for any number of reasons, known or unknown, appear to be suffering in all or part of their range from a non-cyclical decline." Until the causes for those declines are more clearly established, however, these birds probably will not be protected. Also, note that the Blue List does not refer to specific areas and that a decline in one area may not be indicative of the situation for that particular species in another area. The Blue-Listed birds known to occur in or to visit the project area include the western grebe, double-crested cormorant, black-crowned night heron, Cooper's hawk, red-shouldered hawk, marsh hawk, sharp-shinned hawk, prairie falcon, pigeon hawk, barn owl, burrowing owl, snowy plover, Bewick's wren, loggerhead shrike, and yellow warbler.

References

1. "Inventory of Rare, Endangered and Possibly Extinct Plants of California," Santa Clara County Listings, California Native Plant Society, 1971.

2. Munz, P.A., California Flora, University of California Press, Berkeley, Calif., 1968.

3. "A Plan for the Conservation of Resources: An Element of the General Plan of Santa Clara County," County of Santa Clara Planning Commission, June 1973.

4. "At the Crossroads: A Report on California's Endangered and Rare Fish and Wildlife," California Department of Fish and Game, January 1972.

5. "Threatened Wildlife of the United States," U.S. Department of the Interior, Resource Pub. 114, U.S. Government Printing Office, March 1973.

6. Gill, Robert, Jr., "South San Francisco Bay Breeding Bird Survey, 1971," California Department of Fish and Game Wildlife Management Branch Administrative Report No. 72-6, June 1972.

7. "American Birds," The National Audubon Society (in collaboration with the U.S. Fish and Wildlife Service), vol. 26, no. 6, December 1972.

D. Socioeconomic Setting

The installation of flood control measures on 18 of the creeks in the East Zone of the Santa Clara County area would have a significant effect upon many of the social and economic aspects of life in Santa Clara County. Completion of these proposed improvements would render an estimated 25,900 acres of residential, commercial, industrial, and open land safe from fresh water inundation under "100-year flood" conditions. The areas now subject to inundation in a flood of this magnitude are shown in Exhibit A. Approximately one-quarter of this total acreage is currently developed.* Much of the remaining land now has available all of the services necessary to support development except flood control. Installation of the proposed creek improvements might, therefore, be expected not only to provide a greater degree of personal and economic safety to persons and structures now within "floodable areas" which are developed, but also to facilitate development of some areas which are now open land.

Rendering already developed parcels freer from threat of flood would increase the value to the land owners, and likewise would increase the county tax base. The expenditures necessary to construct these flood control improvements would stimulate the construction and building materials supply industries and would create jobs.

On the other hand, residential development of lands rendered "flood safe" as a result of the proposed creek improvements would directly result in added population and in the related demand for more public services.

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*URS estimate.

Industrial and commercial development of these lands would create jobs which could indirectly stimulate further development and still more demand for public services.

The extent to which these and other possible social and economic impacts may result from completion of the proposed improvements is discussed in this section of the report. However, consideration of these impacts is meaningful only in light of an understanding of the local and regional context in which the project is proposed. Therefore, the following discussion deals with the most significant of these contextual aspects.

Community Goals and Plans

The pattern of land development which has come to characterize the Santa Clara Valley during the last 20 years is best described as urban sprawl. Although this term has not been rigorously defined, it generally refers to a pattern of urbanization which is guided almost exclusively by private development interests, with political approval and capital improvement subsidies by local governments. The result is a pattern of scattered development typified by low-density residential subdivisions interspersed with older, economically deteriorating agricultural uses. The pattern of municipal annexation in Santa Clara County has been similar to that of its urbanization, as individual cities have competed for municipal control of developing areas.

It now appears to most urban observers that this pattern of scattered low-density development has exacted heavy social, economic, and environmental costs. Because development of this kind generally requires extensions of utilities and services to a population which is spread out over a wide area, it typically costs local governments more to service than the areas themselves generate in taxes. Often, because of high maintenance costs, this is true even if developers absorb the initial capital costs of these facilities. Also, because scattered development means greater distances between homes, schools, jobs, and shopping, social costs in residents' travel time and dollars are increased. More people are forced to depend upon motor transportation for their daily travel needs, yet public transportation is made less economical to provide by the very geographic dispersal that makes it necessary. This diseconomy of serving scattered development with public transportation is especially significant for those who do not have other transportation -- the young, poor, and elderly.

Premature urbanization also carries negative implications for the environment. Some impacts, which could be avoided or delayed with a more

compact pattern of development, include increased air pollution due to longer automobile trips, loss of scenic natural and prime agricultural areas, and increased water pollution due to runoff from larger areas of urbanization.

In recognition of the costs of sprawl, and in an effort to reduce their future impacts, Santa Clara County, its Local Agency Formation Commission (LAFCO), and most of its constituent municipalities have recently subscribed to a concept of staged urban development by which urbanization would be permitted only where it is a "logical and orderly extension of the existing urban area." The first step in the implementation of this concept has been the development by LAFCO of an Urban Development Policy for Santa Clara County. The framework of this policy and its implications for the East Zone study area are discussed below.

The East Zone of the flood control District lies entirely within the boundaries of Santa Clara County, and abuts or includes all or portions of the spheres of influence of three incorporated municipalities -- San Jose, Morgan Hill, and Milpitas (see Exhibit E). In Santa Clara County, sphere-of-influence boundaries are established by the County Local Agency Formation Commission (LAFCO), with the cooperation of each city, to delineate the limits of the territory which each city may eventually annex. The purpose in establishing these spheres of influence is to prevent annexation competition over disputed territory between adjacent cities.

Urban service areas are those areas within a city's sphere of influence which are presently served by urban facilities, utilities, and services, or which are programmed to be so served in the first five years of the city's capital improvement program. These areas consist of vacant or agricultural lands, as well as urban areas already developed or otherwise urbanized, and

may be either incorporated or unincorporated.* The urban service area boundaries within the study area, which have been designated by the cities in cooperation with LAFCO, are shown in Exhibit F.

In 1971, lands within these urban service area boundaries were classified by LAFCO into three basic categories:

1. Urbanized Areas, consisting of all developed or otherwise urbanized areas, either incorporated or unincorporated, which lie within the urban service area boundary.
2. Urban Expansion Areas, consisting of presently undeveloped vacant and agricultural land, either incorporated or unincorporated, which is already served by utilities and public services, or is proposed to be served in the first five years of the city's capital improvement program.
3. Urban Open Space Areas, consisting of lands which have value for parks and recreation purposes, for conservation of land and other natural resources, or for historic or scenic purposes. According to LAFCO's definition, urban open space areas include publicly owned lands such as parks, utility corridors, water areas, and flood control channels, and could also include certain privately owned lands upon which development should be permanently prohibited for reasons of public health, safety, or welfare, such as landslide areas, earthquake hazard areas, and airport flight path zones. Urban open space areas also may be either incorporated or unincorporated.

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*The proposed amendment to the county's proposed City Services Combining Zoning District Ordinance includes only unincorporated territory in its definition of an urban service area. However, for the purposes of this report, the LAFCO definition, which includes both incorporated and unincorporated lands, will be used.

Areas of the cites and county which lie <u>outside</u> the urban service areas were similarly classified by LAFCO into two basic categories:

1. <u>Urban Transition Areas</u> (short-term open space), consisting of incorporated or unincorporated vacant or agricultural land adjacent to urban service areas which is programmed neither for public facilities nor for utility extensions, but which will most likely be used for urban expansion within the next 5 to 15 years.

2. <u>Nonurban/Open Space Areas</u>, consisting of lands which have value for parks and recreation purposes, conservation of land and other natural resources, historic or scenic purposes, or agriculture. LAFCO has defined two broad categories of nonurban/open space area:

   a. <u>Long-Term Open Space</u>, consisting of lands which may be suitable for urbanization but which will not be needed for development for at least 15 years, as well as lands which may eventually become permanent open space but which are not classified as such at the present time. The latter category includes undeveloped, privately owned land which is virtually precluded from development in the long-term future due to lack of highway access and/or year-round water supply, and land that should be retained in its present state because its use as a managed resource, (such as agriculture and grazing lands or watershed, groundwater recharge areas, or mineral extraction areas) contributes to the wellbeing of the general community.

   b. <u>Permanent Open Space</u>, consisting of publicly owned lands which should remain undeveloped, including parks, utility corridors, water areas, and flood

channels. This category should also include lands upon which development is to be permanently prohibited for reasons of public health, welfare and safety -- more specifically, to meet such needs as the aesthetic and psychological needs of an urban population for open space; the requirements for an adequate air basin, watershed, and groundwater recharge areas for the maintenance of adequate air and water quality; the maintenance of acceptable noise levels; the consideration of public safety with regard to landslides, earthquakes, fire hazards, flooding, and air flight areas; and the maintenance of an ecological balance.

In April 1972, after LAFCO had adopted its "Urban Development Policies for Santa Clara County" (in December 1971), the City of San Jose issued a revision of its own 1970 "Urban Development Policies." The revision eliminated the urban transition area from the city's categorization of lands outside its urban service area by placing urbanized areas in the urban services area, and urban expansion areas and urban open space areas in what was called the "urban reserve area." The development policy for these transition areas was replaced by a transition "process" providing for planned expansion of the urban area according to a set of criteria to be used to determine whether properties mapped as urban reserve should be considered for development.

The potential conflict between San Jose's concept of transition "process" and LAFCO's concept of transition "area" has not yet materialized since, so far, LAFCO has asked for and approved each city's spatial definition only of Urban Service Areas. The significance of the urban service area boundary is that it separates areas which are developed or may become developed or developable within approximately the next five years from areas which will remain undeveloped or undevelopable under present county and municipal policies for at least five to fifteen years, and perhaps permanently.

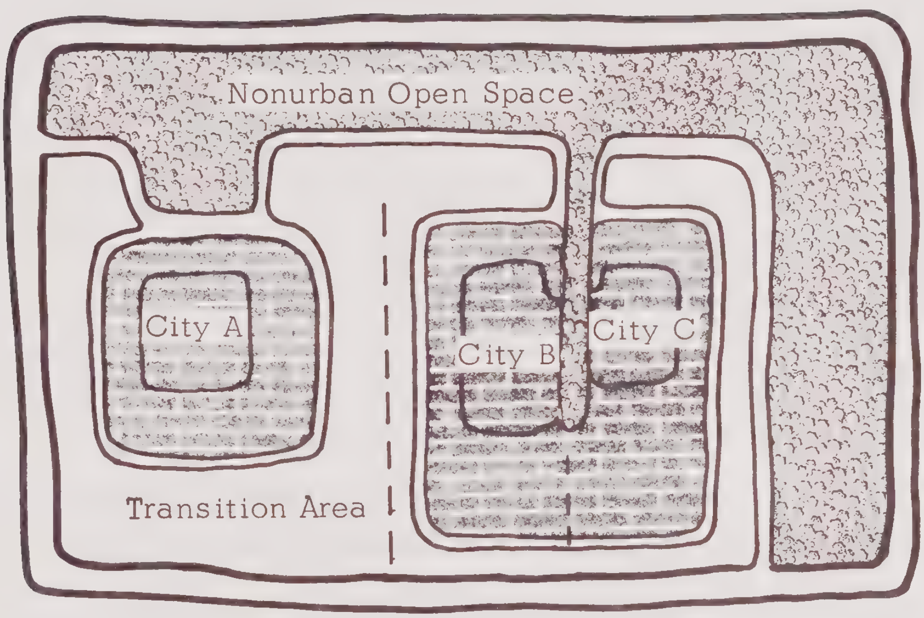
Figure III-24 is a diagram of the interrelationships among the LAFCO urban land development areas once the boundaries between the nonurban open space and transition areas have also been determined. These boundaries are not expected to be determined until at least 1974.

Exhibit G shows those land areas in the East Zone that are currently developed and those that are currently undeveloped. Comparing this exhibit with Exhibit F (urban service areas) and Exhibit A, which shows land areas theoretically subject to inundation in a 100-year flood that would be protected by the installation of the proposed creek improvements, three basic types of areas may be observed:

1. Developed or undevelopable areas within urban service areas which theoretically would become protected from flooding
2. Undeveloped areas within urban service areas which could become more developable due to the protection from flooding
3. Undeveloped areas outside urban service areas which, even if protected from flooding, would not become developable for at least five to fifteen years, if at all.

These three types of areas and the boundary of the region now subject to possible inundation are shown in Exhibit H.

Lands within the urban service areas that are considered to be developed or undevelopable consist of lands presently in residential, commercial, and industrial uses, buildings in public or quasi-public uses, and open space consisting of parks, private open space, water and water channels, and marshlands.



Source: LAFCO, "Urban Development Policies for Santa Clara County."

FIGURE III-24 CONCEPT DIAGRAM OF LAFCO URBAN DEVELOPMENT AREAS

The portions of urban service areas that are classified as undeveloped but developable are those presently in orchard or other cultivated agricultural use, grazing, forest or brushlands, and vacant urban land. Lands outside urban service areas that are classed as "undevelopable" are essentially undeveloped now and are not served by municipal services and utilities.

A primary element of the LAFCO and San Jose urban development policies is that "existing and future urban land uses should be in cities." In simplified form, this means that urban development should be confined not only to urban service areas, but to incorporated areas within them.

In an effort to insure the implementation of this policy, the county is now considering the adoption of a "City Services Combining Zone" which would restrict future development of unincorporated portions of urban service areas. According to a memorandum prepared by the office of the Santa Clara County Counsel, the principal uses permitted under this zoning designation would be agriculture and single family residences on lots at least 2-1/2 acres in size. The ordinance would permit a zoning exception through a use permit procedure, providing the Planning Commission finds either (1) that the proposed use would not require nor benefit from city services and would not interfere with the orderly growth and efficient and economic utilization of community resources, or (2) that the applicant has attempted to annex his property and failed and that the public health and safety will not be endangered by the lack of city services. If rigorously applied by the Planning Commission and Board of Supervisors, this ordinance would require annexation as a precondition of future development by effectively prohibiting development of unincorporated areas of the county, even where urban services already exist.

The ordinance establishing this zone is expected to meet the approval of the County Planning Commission and Board of Supervisors, and to be adopted before the end of 1973. The areas in which development would be curtailed as a result of its adoption are shown in Exhibit I.

The San Jose City Countil has recently established an additional precondition to approval of development in its East Zone -- the prospective development must conform to the development guidelines established by the city's East Zone Interim Policy in January 1972. According to these guidelines:

> "Parcels within the study area but not in an area subject to inundation from overland flow or from existing watercourses may be developed provided that the subject parcels can be drained by a storm drainage trunkline which discharges into an existing watercourse. This watercourse or storm drainage trunkline shall be in its permanent location as determined in the overall storm drainage master plan and shall have a defined channel to provide discharge of storm waters to the bay.
>
> Provisions must also be made to protect the proposed development from flooding by overland sheet flow. The overland flow must be collected and discharged in a manner which will not cause erosion to adjacent lands."

The effect of these guidelines is to place upon a prospective developer the burden of providing acceptable flood control and storm drainage facilities where such facilities do not already exist. Because of the generally high costs of installing these improvements, and because of the large area in which they are presently required, much of the East Zone has been rendered effectively undevelopable by this interim policy. Moreover, there is no immediate prospect for dropping or substantially altering this policy, although it was originally intended to be reevaluated in the light of a recently completed engineering study of the effects of urbanization on East Zone flood and drainage conditions.

Although the Interim Policy has served to curtail development in the East Zone, it has not altogether prevented it. Since adoption of the policy, the following East Zone subdivision developments have received final approval in accordance with policy guidelines:

Area	Approx-imate Acres	Developer	Develop-ment	Approx-imate No. Units	Type
Edenvale	150	Larwin	Encore	800	1-Family Detached
		Arcadia	--	300	1-Family Detached
	120	Standard Pacific	--	100	1-Family Detached
		Ponderosa	--	200	1-Family Detached
Subtotal	270			1,400	
Evergreen	14	American Housing Guild	--	70	1-Family Detached
	80	Singer	Meadowglen	324	1-Family Detached
	60	Standard Pacific	Carefree Townhomes	323	Town-houses
	70	Braddock and Logan	Greenmont West	350	1-Family Detached
	80	Singer	Valley Green	300	1-Family Detached
Subtotal	304			1,387	
TOTAL	574			2,787	

A further regulatory tool which is presently under consideration by the City is floodplain zoning. Although the terms of the draft ordinance and the definition of the areas that may be affected have not yet been resolved, such a regulation could impose additional restrictions on floodplain development where a demonstrable danger to public safety existed.

Community participation in the San Jose planning process has been particularly active in the Evergreen Area of the East Zone. A plan for this area was prepared by a citizen's planning committee authorized by the San Jose City Council in early 1971. The Evergreen Area Plan was intended to represent a "comprehensive, long range guide for future development," although it does not "contain nor establish specific regulations or legislation." A slightly modified version of the land use portion of the plan is expected to be adopted as an official amendment to the San Jose General Plan late in 1973. A significant community sentiment reflected in a major recommendation of the plan is that new housing demand in the Evergreen Area should be accommodated "in such a fashion and only to such an extent as is compatible with the atmosphere of a predominantly single family community of relatively low overall density."

It may be expected that, insofar as the proposed flood control improvements incrementally contribute to the developability of portions of the area, the improvements will be resisted by many local residents (see also the land use section of this report). The fact that the plan was prepared at all is indicative of a strong and cohesive local community structure whose members are generally intent upon preserving the existing residential amenity of their community.

So far, our discussion of the planning context of the proposed East Zone flood control improvements has focused upon unincorporated areas within the jurisdiction of the county, and upon incorporated areas within the jurisdiction of the City of San Jose. However, portions of the planning areas of two other municipalities, Milpitas and Morgan Hill, are also within the study area.

Milpitas adopted the LAFCO Urban Development Policy in January 1972. Because the city was experiencing a rate of residential growth which was rapidly outstripping both its ability to provide necessary municipal services and its ability to pay for them, it has also adopted a regulation of residential development which completely forestalled residential construction in FY 1972-73 and will permit only a limited amount in FY 1973-74.

Development in the area that can be inundated by Berryessa Creek is presently further restricted by the precondition that acceptable creek channel improvements be installed. These improvements have the District's first priority for construction, and their completion would remove a major obstacle to the development of the city's planned "Town Center," some ancillary residential development northeast of the creek, and the light industry planned for properties immediately adjacent to the creek, west and south of the "Town Center" (see also the land use section of this report).

The implications of the proposed flood control project are not so dramatic for Morgan Hill. The improvements to Coyote Creek, along the northern edge of the city's sphere of influence, would not occur until after 1986, and since the immediate area on both sides of this section of creek is designated as community park by the City General Plan, it should remain essentially undevelopable even then. The modified floodplain type of improvement which is proposed for this section of the creek would be generally compatible with a streamside park.

The implications of the proposed East Zone flood control improvements, in the context of community plans and goals, have so far been discussed only in the general terms of existing and prospective city and county urban development policies and regulations.* However, each of the cognizant jurisdictions

*For a more detailed discussion of the implications of the proposed improvements for private land development in the study area, see the land use impacts section of this report.

in the study area has also developed more definitive plans and policies for the designation and utilization of open space and recreation areas. One such plan is the recently completed Urban Development/Open Space Plan for Santa Clara County, which was adopted by the Planning Policy Committee of Santa Clara County in April 1973 and by the County Board of Supervisors in May 1973. It is presently being reviewed, and is expected to be approved by most, if not all, Santa Clara County cities in the near future.

The Plan contains two basic major recommendations:

1. That local governments recognize all forms of open space resources in the county and work to preserve them,

2. That local governments adopt explicit urban development policies aimed at implementing the concept of staged urban development.

Earlier in this section we have seen how the county and cities are working toward achieving the second of these goals through implementation of their urban development policies. Similarly, through the general planning process and its various implementation procedures, these jurisdictions are also working toward achieving the first goal. A major focus of these efforts is the designation and development of creekside park chains. Two San Jose planning instruments, the Open Space Element of the San Jose General Plan as amended in April 1973 (See Exhibit J), and the overall General Plan 1966-2010 as amended in 1971 (see Exhibit K), show a network of such creekside parks in the eastern portion of the city's planning area. Where apparent conflicts between the two plans exist, the more recent and more specific General Plan amendment takes precedence.

The results of the amendment in terms of the creeks in the project area were:

1. The streamsides of the upper portion of Lower Silver Creek between Silver Creek Road and Tully Road were changed from their earlier designation as "Parks and Open Space" to "Developed Area" on the west bank and "Undeveloped Area" on the east bank. This change affects approximately 4,000 feet of creek in the study area.

2. The designation of the streamsides along Lower Silver Creek and Thompson Creek between approximately the Holly Oak School and the confluence with Coyote Creek was changed from "Parks and Open Space" to "Recharge Areas" and "Developed" and "Undeveloped Areas." This change affects approximately 32,000 feet of creek in the study area.

3. The designation of the portion of Upper Penitencia Creek between Capitol Avenue and the confluence with Coyote Creek was changed from "Parks and Open Space" to "Recharge Areas" and "Undeveloped Areas." These changes affect approximately 9,000 feet of creek.

4. The designation of most of the streamside of Coyote Creek between the William Street Park in San Jose and the bay was changed from "Parks and Open Space" to "Developed" and "Undeveloped" areas, except that from about the Agnews State Hospital north to the bay, it was changed to a "possible" future park site. These changes affect approximately 57,000 feet of creek in the study area, about 40,000 feet of which are north of Brokaw Road and west of the Nimitz Freeway.

In all, over 100,000 feet, or approximately 19 miles, of creekside originally designated as "Public Parks and Open Space" in the 1971 San Jose General Plan map have a different designation in the new 1973 San Jose Open Space Plan map. The San Jose Open Space Plan map also displays some apparent differences from the "Report and Recommendations on Flood Plain and Flood Control Policies," which was prepared in February 1973 by a joint

task force of city staff representatives from the departments of Parks and Recreation, Planning, and Public Works, and from the Office of the City Attorney. This report, which predates the city's Open Space Plan, recommends that a streamside be considered for inclusion in the park system of the city if it meets at least one of the following conditions:

1. That it provides a unique natural open-space setting after flood control work is completed
2. That it provides considerable recreation opportunities as the result of a flood control project, although the area may not be a unique natural setting
3. That it is contiguous to connecting links with other publicly owned recreation areas, schools, libraries or community focal points
4. That it is a part of a city-wide hiking and equestrian trail and bike path system.

By application of these criteria, the committee arrived at the proposed system of park chains shown in Figure III-25. These recommendations also show several park chain extensions not shown in the existing San Jose Open Space Element. Like the original General Plan, the task force report proposes park chain extensions along the entire length of Coyote Creek, along the portion of Penitencia Creek between Capitol Avenue and Coyote Creek, and along Thompson Creek north from Holly Oak School to approximately Ocala Road, an additional distance of approximately 9,000 feet. The task force report also proposes a streamside park along approximately 8,000 feet of Berryessa Creek which is not designated for park use at all in the General Plan.

Like the city, the county has adopted an amendment to the county General Plan which reflects its goals for "regional" creekside park chains. This "Plan of Regional Parks for Santa Clara County" was adopted by the County

FIGURE III-25 PARK CHAINS PROPOSED BY CITY STAFF JOINT TASK FORCE
(in "Report and Recommendations on Flood Plain and Flood Control Policies," February 1973)

Board of Supervisors in February 1972. The emphasis of the plan is upon regional parks, and although it recognizes the necessity of inner city parks and open spaces in providing a high quality of life within urban communities, its plan map does not show specifically neighborhood, community or city parks.

The regional park plan map shown in Exhibit L is intended to reflect the following county goals:

1. The utilization of our finest natural resources to meet our park and open space needs
2. The provision of a balance of types of regional parks in a balanced geographic distribution
3. An integrated park system with maximum continuity and a clear relationship of elements -- using scenic roads and trails as important linkages in the system
4. The use of parks to give structure and livability to our urban communities
5. The provision of recreation facilities for those activities most needed by the people of the county

Within the context of these park plan goals, the streamsides of the county are a focus of particular attention. The plan findings are that streamsides are "rich in beauty and recreation opportunity," and that they should be utilized to their fullest for their open space and recreation potential. If left in their natural state, they can give "welcome relief to the buildings and pavements of the urban development which is rapidly filling the valley." According to the plan, streams also offer the possibility of "walking, riding or bicycling on bankside trails in a natural

setting, safe from traffic," and have a "potential for development as streamside park chains."

Because of its emphasis on regional parks, the Regional Plan map shows only two of the park chains indicated on the San Jose Open Space Plan map -- the Penitencia Creek Park Chain and the Coyote Creek Park Chain. However, in each case, the extent of the park chains shown in the county plan is more consistent with the 1971 City General Plan map and the city staff task force report and recommendations than with the abbreviated park chains depicted in the city's more recent General Plan Open Space amendment.

Although the city's Open Space Element is presently the preeminent open space planning instrument for the San Jose Planning Area, the more extensive park chain proposals reflected in the 1971 San Jose General Plan map, the 1972 County Plan for Regional Parks, and the 1973 city staff task force "Report and Recommendations on Floodplain and Flood Control Policies" clearly suggest that in the future park chain planning could be extended to include part or all of the streamsides discussed above. A major question, then, concerns the recreational and scenic compatibility of existing, planned, proposed, or possible park chains with the channel improvements proposed by the District. This question will be discussed in the scenic and recreation impacts section of this report.

Population

Santa Clara County has a long history of sustained economic growth. In fact, the most notable feature which emerges from an analysis of the economic setting of Santa Clara County, especially San Jose, is its extraordinary rate of growth in population, employment, and personal income.

Since its emergence as an industrial community in the early 1950s, the San Jose SMSA has experienced extraordinary population growth. During the 1950-1960 decade, the Greater San Jose community grew at an ever-increasing rate. Annual growth rates rose from 5 percent in 1950 to 8 percent in 1954 and to a peak of 10 percent in 1959 and 1960.

Since then growth has continued, but at a diminishing rate. During the latter half of the 1960-1970 decade, growth in the community leveled off at about 3 percent per year. Table III-15 describes the population growth of the San Jose SMSA from 1950 to 1970 and details the demographic components that constitute that growth.

In absolute numbers, the San Jose SMSA population continues to grow at a considerable pace. In fact, with the exception of the late 1950s and early 1960s, annual population growth has been about 35,000 persons per year.

Population growth is accomplished through the combined effects of natural increase (excess of births over deaths) and net in-migration (the excess of in-migrants over out-migrants). In absolute numbers, in-migration provided about two-thirds of the past two decades' growth. Natural increase, on the other hand, has become a significant source of new growth only during the last few years.

Table III-15

COMPONENTS OF YEARLY POPULATION INCREASE
SAN JOSE SMSA
1950-1970

			Number of Persons (000)			Percent Distribution		
Year	Population (000)	Interval	Total Increase	Estimated Natural Increase	Estimated Net In-migration	Total Increase	Estimated Natural Increase	Estimated Net In-migration
1950	291							
		1950-51	16	5	11	100%	31%	69%
1951	307							
		1951-52	23	5	18	100	22	78
1952	330							
		1952-53	23	6	17	100	26	74
1953	353							
		1953-54	30	7	23	100	23	77
1954	383							
		1954-55	33	7	26	100	21	79
1955	416							
		1955-56	35	8	27	100	23	77
1956	451							
		1956-57	38	9	29	100	24	76
1957	489							
		1957-58	43	10	33	100	23	77
1958	532							
		1958-59	52	11	41	100	21	79
1959	584							
		1959-60	58	12	46	100	21	79
1960	642							
		1960-61	51	13	38	100	25	75
1961	693							
		1961-62	44	14	30	100	32	68
1962	737							
		1962-63	58	15	43	100	26	74

Table III-15 (continued)

COMPONENTS OF YEARLY POPULATION INCREASE
SAN JOSE SMSA
1950-1970

Year	Population (000)	Interval	Number of Persons (000): Total Increase	Number of Persons (000): Estimated Natural Increase	Number of Persons (000): Estimated Net In-migration	Percent Distribution: Total Increase	Percent Distribution: Estimated Natural Increase	Percent Distribution: Estimated Net In-migration
1963	795							
		1963-64	48	15	33	100%	31%	69%
1964	843							
		1964-65	40	14	26	100	35	65
1965	883							
		1965-66	37	14	23	100	38	62
1966	920							
		1966-67	48	13	35	100	27	73
1967	968							
		1967-68	38	13	25	100	34	66
1968	1,006							
		1968-69	29	13	16	100	45	55
1969	1,035							
		1969-70	31	20	11	100	64	36
1970	1,066							

Source: County of Santa Clara Planning Department.

Compared with state and regional population trends, the San Jose SMSA record is noteworthy. As Table III-16 illustrates, the community outpaced its regional neighbors as it increased its share of Bay Area population during the 20-year period.

Table III-16

SAN JOSE SMSA AND BAY AREA POPULATION
1950-1970

	1950		1960		1970	
	Population	Percent of Bay Area	Population	Percent of Bay Area	Population	Percent of Bay Area
Bay Area	2,681,322	100.0%	3,638,939	100.0%	4,691,600	100.0%
County						
Alameda	740,315	27.6	908,209	25.0	1,080,700	23.0
San Francisco	775,357	28.9	740,316	20.3	703,300	15.0
Santa Clara[a]	290,547	10.8	642,315	17.7	1,101,000	23.5
San Mateo	235,659	8.8	444,387	12.2	556,800	11.9
Contra Costa	298,984	11.2	409,030	11.2	570,900	12.2
Sonoma	103,405	3.9	147,375	4.1	213,100	4.5
Marin	85,619	3.2	146,820	4.0	207,200	4.4
Solano	104,833	3.9	134,597	3.7	177,100	3.8
Napa	46,603	1.7	65,890	1.8	81,500	1.7

a. Equals San Jose SMSA.

Source: U.S. Census data.

The geographic distribution of this population is shown in Table III-17. During the 1950 to 1960 decade, the significant areas of new settlement were Los Gatos, Mountain View, Palo Alto, San Jose, Santa Clara, and Sunnyvale. Of these municipalities, Sunnyvale experienced the most explosive growth. Its population grew to more than five times its 1950 total during the ten years that followed.

During the 1960-1970 decade, these incorporated areas continued to achieve high absolute growth. Younger and smaller communities, however, experienced even greater growth rates. Growth leaders during this period were Campbell, Cupertino, and Milpitas. Figure III-26 graphically presents these municipal growth trends.

Santa Clara County is divided into 25 planning areas. In Figure III-27 the areas in the East Zone that are subject to inundation from the 18 creeks during a 100-year design flood have been superimposed upon a map outlining the county's planning areas. It is evident that the following nine planning areas would be subject to inundation:

A. San Jose
B. Evergreen
C. Alum Rock
D. Berryessa
E. Milpitas
F. Alviso
G. Agnew
S. Edenvale
T. Coyote

Four of these areas -- San Jose, Evergreen, Milpitas, and Edenvale -- have historically shown notable rates of population growth, as demonstrated in Table III-18. In the 1960s, Planning Area A (San Jose) experienced the highest amount of absolute growth while the remaining three were among the top four in the county with regard to percentage rate of growth. Edenvale showed a spectacular 1,884-percent growth rate.

Table III-17

POPULATION OF CITIES IN SANTA CLARA COUNTY
1950-1970

	1950[a]	1960[a]	1966[b]	1970[a]
TOTAL COUNTY	290,547	642,315	919,653	1,066,714[c]
Alviso	652	1,174	1,311	d
Campbell	e	11,863	21,214	24,770
Cupertino	e	3,664	12,042	18,216
Gilroy	4,951	7,348	10,253	12,665
Los Altos	e	19,696	23,784	24,956
Los Altos Hills	e	3,412	5,824	6,865
Los Gatos	4,907	9,036	18,591	23,735
Milpitas	e	6,572	19,831	27,149
Monte Sereno	e	1,506	2,065	3,089
Morgan Hill	1,627	3,151	4,588	6,485
Mountain View	6,563	30,889	48,513	51,092
Palo Alto	25,475	52,287	55,264	55,966
San Jose	95,280	204,196	359,482	445,779[d]
Santa Clara	11,702	58,880	82,493	87,717
Saratoga	e	14,861	21,941	27,110
Sunnyvale	9,829	52,898	84,799	95,408
Unincorporated	129,561	160,882	147,658	153,712

a. U.S. Census of Population (final figures).
b. 1966 Countywide Special Census.
c. U.S. Bureau of Census revision, December 1971.
d. City of Alviso merged with the City of San Jose on March 12, 1968.
e. Not yet incorporated.

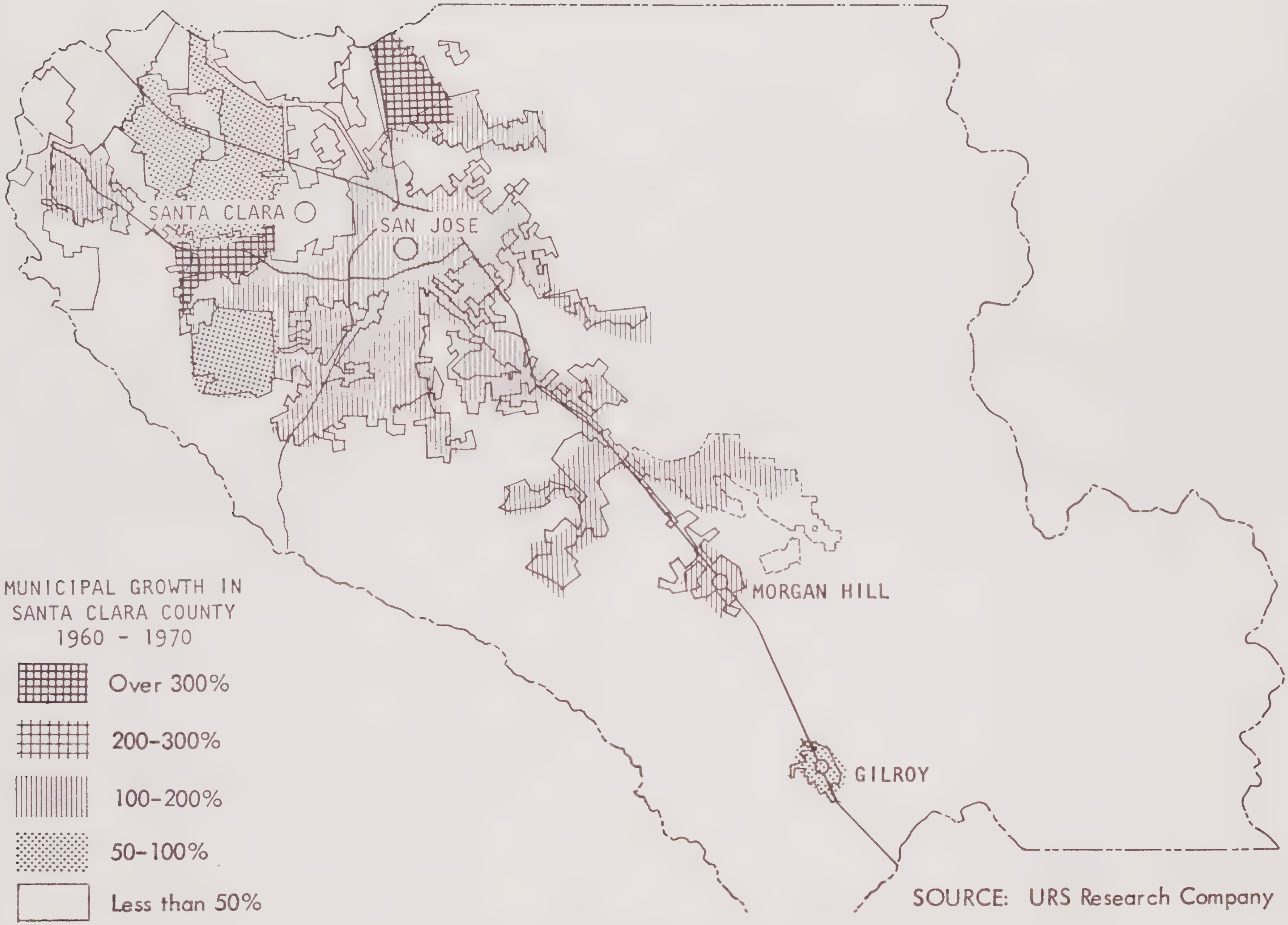


FIGURE III-26 SANTA CLARA COUNTY GROWTH TRENDS

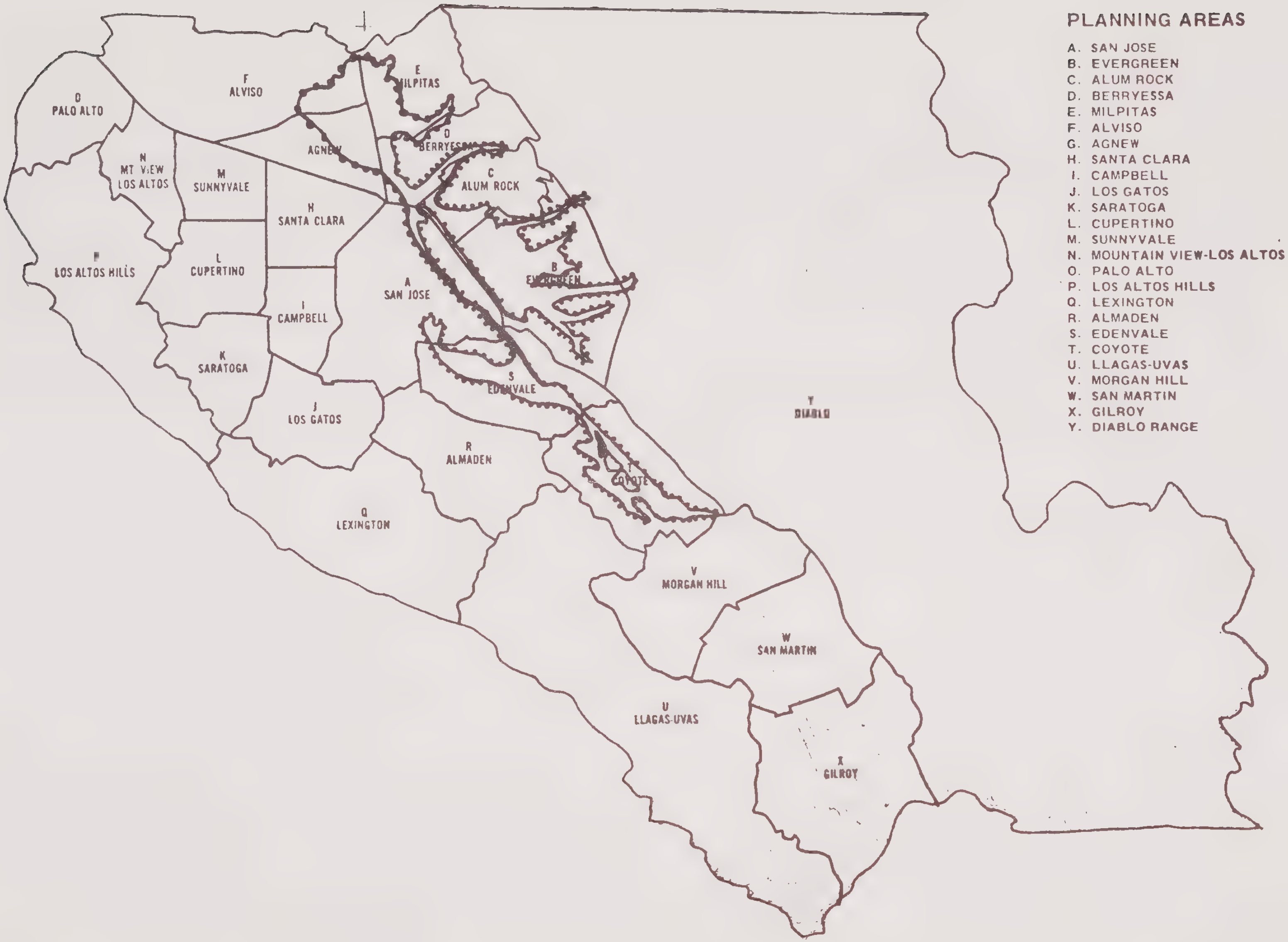


FIGURE III-27 GENERALIZED PLANNING AREAS SUBJECT TO FLOOD INUNDATION

Table III-18

TRENDS IN TOTAL POPULATION
BY PLANNING AREA
SANTA CLARA COUNTY: 1960, 1966, AND 1970[a]

Planning Area	Total Population 1960	1966	1970[b]	Growth 1960-1970 Persons	Percent
Subject to Flooding from East Zone Creeks					
A. San Jose	169,527	212,184	225,670	56,143	33%
B. Evergreen	15,688	35,080	50,851	35,163	224
C. Alum Rock	36,379	46,209	51,114	14,735	41
D. Berryessa	3,135	7,571	11,561	8,426	269
E. Milpitas	6,968	23,939	34,580	27,612	396
F. Alviso	5,190	5,191	6,506	1,316	25
G. Agnew	15,159	17,281	18,822	3,663	24
S. Edenvale	2,233	13,806	44,299	42,066	1,884
T. Coyote	1,541	1,354	1,410	(131)	(9)
Sub-Totals	255,820	362,615	444,813	188,993	74%
Not Subject to Flooding from East Zone Creeks					
H. Santa Clara	65,884	82,123	83,266	17,382	26
I. Campbell	41,891	78,426	89,107	47,216	113
J. Los Gatos	27,628	41,491	47,955	20,327	74
K. Saratoga	15,329	22,574	27,501	12,172	79
L. Cupertino	43,028	80,489	92,333	49,305	115
M. Sunnyvale	41,073	60,511	70,024	28,951	70
N. Mt. View - Los Altos	56,704	73,141	77,174	20,470	36
O. Palo Alto	61,446	67,485	67,875	6,429	105
P. Los Altos Hills	6,993	10,562	11,374	4,381	63

Table III-18 (continued)

TRENDS IN TOTAL POPULATION
BY PLANNING AREA
SANTA CLARA COUNTY: 1960, 1966, and 1970[a]

Planning Area	Total Population			Growth 1960-1970	
	1960	1966	1970[b]	Persons	Percent
Not Subject to Flooding from East Zone Creeks (continued)					
Q. Lexington	2,763	2,854	2,829	66	2%
R. Almaden	2,734	11,921	21,349	18,615	681
U. Llagas-Uvas	770	807	1,224	454	59
V. Morgan Hill	5,052	6,738	7,662	2,610	52
W. San Martin	3,534	4,259	2,535	(999)	(28)
X. Gilroy	11,056	13,170	15,410	4,354	39
Y. Diablo	610	491	10	(600)	(98)
Unallocated[c]	--	--	2,872		
TOTAL	642,315	919,657	1,065,313		

a. Source: Santa Clara County Planning Department, "Trends, Total Population and Total Dwelling Units, Planning Areas, Santa Clara County, 1960, 1966, and 1970," May 1973.
b. Bureau of the Census final revised figures, received April 20, 1973.
c. Not assigned to planning areas.

According to the 1970 U.S. Census, a total of 444,813 persons live in the nine planning areas which are subject to 100-year flood inundation. But none of these planning areas would be wholly flooded in a 100-year, or "design," flood. As Figure III-27 indicates, some would still remain essentially dry under flood conditions of that magnitude. URS Research Company has made a rough estimate of the population of the portions of each of these areas which are subject to flooding. These estimates are presented in Table III-19.

Table III-19

ESTIMATED POPULATION OF LANDS SUBJECT TO INUNDATION DURING 100-YEAR FLOOD, BY PLANNING AREA[a]

Planning Area	Total Population of Planning Area[b]	Population of Floodable Portion: Numbers	Population of Floodable Portion: Percent of Total Population
A. San Jose	225,670	200	< 1%
B. Evergreen	50,851	44,600	88
C. Alum Rock	51,114	18,500	36
D. Berryessa	11,561	500	4
E. Milpitas	34,580	8,700	25
F. Alviso	6,506	1,800	28
G. Agnew	18,882	600	3
S. Edenvale	44,299	14,900	34
T. Coyote	1,410	1,200	85
TOTAL	444,813	91,000	∿ 20%

a. Source: URS estimate.
b. U.S. Census, 1970.

Note that essentially all of the residential areas in the Evergreen and Coyote Planning Areas are subject to inundation, while almost none of those in the San Jose, Berryessa, and Agnew Planning Areas are endangered.

Land Uses and Value

Santa Clara County covers an area of approximately 839,680 acres. Roughly one-third of this (280,000 acres) is relatively flat. The remaining acreage is rough terrain, bounded on the east by the Diablo Range and on the west by the Santa Cruz Mountains.

In the past two decades, the dramatic growth in population and industry in Santa Clara County has induced a rapid development program which has taken land out of agricultural production and committed it to urban-related uses. Between 1960 and 1965, some 3,700 acres of prime agricultural land and 1,300 acres of nonprime land were converted to nonfarm uses.

The primary sources of data on land use trends in Santa Clara County are two land use inventories made by the County Planning Department, one in 1962 and one in 1967. These inventories are summarized in Table III-20.

The pace of industrial development in Santa Clara County from 1950 to 1970 was very rapid. In this 20-year period, developing industry changed the economic character of San Jose and many surrounding communities. Within the last decade, the growth in new industrial plants has been consistently strong.

During the 1950-1970 period, manufacturing employment increased sixfold, from 21,300 to 123,500. These data do not fully reveal the extent of growth, because there was considerable industrial employment (in warehousing and research and development) that was nonmanufacturing in nature and therefore is not included in these totals. However, in manufacturing alone, in the 1960s Santa Clara County accounted for 80 percent of the net new employment of the Bay Area.

Table III-20

LAND USE IN SANTA CLARA COUNTY
1962 AND 1967

LAND USE CHANGE 1962-67 SANTA CLARA COUNTY IN ACRES	1962 TOTAL	URBAN DEVELOPED										URBAN VACANT TOTAL	NON URBAN				
		TOTAL	RESIDENTIAL				INDUST.	COMM'L	STREETS	URBAN OPEN SPACE	OTHER URBAN		TOTAL	REGIONAL PARKS	INTENS. AGRIC.	EXTENS. AGRIC.	OTHER NON-URBAN
			Total	Single Family	Multi-Family	Other Resid.											
1967 TOTAL	847,120	110,800	48,312	43,806	3,803	703	6,713	4,471	28,416	5,462	17,427	18,677	717,643	17,357	97,458	570,853	31,975
URBAN DEVELOPED	89,296	86,198	37,355	34,371	2,545	439	4,787	3,285	23,583	3,922	13,255	1,688	1,411	406	485	302	217
RESIDENTIAL	39,420	37,883	37,043	34,183	2,429	432	93	247	345	14	142	971	566	2	376	173	15
Single Family	36,624	35,175	34,445	34,048	364	33	81	214	309	13	113	913	536	2	349	170	14
Multi-Family	2,349	2,272	2,198	123	2,056	20	4	28	29	1	11	47	29	—	26	3	—
Other Residential	447	435	399	13	8	378	7	5	6	—	18	10	1	—	1	—	—
INDUSTRIAL	5,191	4,959	74	56	17	1	4,473	196	72	16	129	171	61	—	37	12	12
COMMERCIAL	3,336	3,153	86	64	17	4	151	2,769	86	23	39	159	23	—	14	5	4
STREETS	22,956	22,894	13	11	1	—	6	5	22,845	2	24	44	18	—	12	3	3
URBAN OPEN	4,643	4,023	27	27	—	—	1	23	30	3,845	97	153	467	404	12	21	30
OTHER URBAN	13,750	13,285	113	30	81	3	64	46	215	23	12,823	190	275	-	34	89	153
URBAN VACANT	15,387	7,192	3,615	2,887	643	86	786	820	1,045	181	983	7,812	382	2	184	42	154
NON URBAN	742,438	17,410	7,341	6,548	616	178	1,138	565	3,778	1,379	3,209	9,178	715,850	16,949	96,789	570,508	31,603
REGIONAL PARKS	17,299	567	—	—	—	—	—	—	1	552	14	2	16,730	16,730	—	—	—
INTENSIVE AGRICULTURE	120,473	13,607	6,183	5,443	601	140	878	549	3,222	452	2,322	7,028	99,838	109	91,871	7,382	477
EXTENSIVE AGRICULTURE	575,681	2,942	1,134	1,081	15	38	184	16	515	357	735	1,992	570,747	76	4,818	562,928	2,924
OTHER NON-URBAN	28,985	294	23	23	—	—	75	1	40	17	138	155	28,535	34	100	199	28,202

HOW TO READ THE LAND USE CHANGE TABLE

The total area of the County is 847,120 acres. The way this land was used in 1962 is seen by reading down the first column headed "1962 TOTAL." In 1962, for example, 89,296 acres were developed in some type of urban use; 15,387 were "Urban Vacant;" and 742,438 were "Non-urban."

Changes in land use between 1962 and 1967 are found by reading across the table. For example to determine what happened to land which was in "Intensive Agriculture" in 1962, find the appropriate row and read across: 13,607 acres went into "Urban Developed" (composed of "Residential," "Industrial," "Commercial," "Streets," "Urban Open Space," and "Other Urban"); 7,028 acres went into "Urban Vacant;" 99,838 acres of such lands were in "Non-urban" uses in 1967, of which 91,878 acres remained unchanged in the "Intensive Agriculture" category.

The 1967 land use totals are indicated in the top row for example, 110,800 acres were "Urban Developed;" 97,458 were in "Intensive Agriculture;" and so on.

The way land, in a particular category in 1967, was used in 1962 can be determined by reading down the table. For example, of the 43,806 acres in "Single Family" residential use in 1967, 34,371 were in some urban use in 1962; 2,887 were "Urban Vacant;" and 6,548 were "Non-urban." Of the 34,371 "Urban Developed" acres, 34,048 were already in single family use. The small remainder represents the amount of urban developed land converted to single family use. Most of the "Non-urban" land, 5443 acres, was in "Intensive Agriculture."

Source: Santa Clara County Planning Department.

The development and absorption of industrial land have tended to progress from north to south through the county. As the Industrial Development Committee of San Jose pointed out in its 1970 report, Palo Alto and Mountain View are now essentially fully developed as far as industry is concerned. Sunnyvale still has some acreage, but much of it is being held for particular uses and the remainder is quite high priced. Santa Clara still has considerable land for industry (about 1,800 gross acres), as does San Jose, which has over 4,000 acres in the north San Jose, Berryessa, and Alum Rock areas alone, according to the latest available data. The estimated total availability of industrial land in the north county and San Jose in 1970 was about 10,700 gross acres. This does not, of course, include land in south San Jose, Morgan Hill, or Gilroy.

The absorption rate for industrial land in Santa Clara County was high during the 1960s. In the 1965-1970 period, it was estimated at 400 gross acres per year.

Commercial and residential absorption rates of the available developable land in Santa Clara County have kept pace with the industrial rates. Table III-20 indicates, for example, that between 1962 and 1967 a total of 15,812 acres of agricultural and "other nonurban" land was developed for residential (93 percent) and commercial (7 percent) purposes.

A large portion of the total number of residential units constructed in the county in recent years have been in the nine planning areas which have been identified here as subject to floodwater inundation from the 18 creeks in the East Zone that are proposed for flood control improvement. An examination of residential building trends between 1970 and 1972 demonstrates that more than 42 percent of total dwelling units constructed in the county during those years were located in one of the "floodable" planning areas (percentage of total is shown after each):

Planning Area	1970-1972 Percent of Total Dwelling Units Constructed in County
*A San Jose	12.8%
*B Evergreen	4.5
C Alum Rock	3.6
*D Berryessa	4.3
E Milpitas	3.7
F Alviso	0
G Agnew	1.3
*S Edenvale	12.3
T Coyote	0
TOTAL	42.5%

Note above that the four "starred" planning areas alone contained nearly 34 percent of the new units constructed in those years. In fact, San Jose and Edenvale were among the top three planning areas in the county in this regard.*

It has been estimated that the lands which are subject to inundation within the nine planning areas listed above total approximately 25,900 acres. Of this total, roughly 6,800 acres are developed in either residential, commercial, industrial, public and quasi-public buildings, or open space land use, and the remaining 19,100 acres currently constitute the "undeveloped" county land use categories termed "agriculture: orchard," "agriculture: other cultivated," "grazing, forest, and brush," and "vacant urban." About 5,000 acres of this undeveloped land is located outside of the urban services area (described in the previous section). As such, it must not be considered as available for development, at least within the next five years. Note, however, that nearly 90 percent of this land is in the Coyote Planning Area,

*Statistical source: County of Santa Clara Planning Department; derived from surveys by Harrington Housing.

which is outside of the sphere of influence of any incorporated city. No current General Plan presently deals with this area.

The remaining undeveloped floodable land, about 14,100 acres, lies within the urban services area. This acreage is broken down in terms of planned use within each planning area in Table III-21. The table places greatest emphasis upon planned usage of residentially developable land because it is this gross acreage which, when adjusted to yield "net residential acreage," can be readily translated into potential population-holding capacity. In this table lands planned for industrial, commercial, and park use have been grouped in the "other" category. Unplanned areas are also included in this category. These land uses will be discussed here as they apply to the outlook for their respective Planning Areas.

Developed Land

It is evident in Figure III-27 that the majority of land subject to floodwater inundation by the creeks of the project area is located east of Highway 101. The largest portion of developed residential land is also located east of 101; the most dense developments are in the Evergreen, Edenvale, Agnew, and Milpitas Planning Areas. It was pointed out earlier that an estimated 91,000 persons are housed in these 6,800 acres of developed "floodable" land. It is important to understand some basic characteristics of these households. First, while average annual household incomes in the San Jose SMSA as a whole have risen in recent years faster than those in the San Francisco SMSA or in the State of California (Figure III-28), in the subject areas incomes average in the middle to lower-middle levels (Figure III-29). Second, median housing values in the nine planning areas subject to "flooding" essentially parallel these income levels, as might be expected. Table III-22 illustrates that median housing values in the planning areas subject to flooding are somewhat lower than the average for all county planning areas. In fact, six of the nine areas fall below $25,500, the countywide median point.

Table III-21

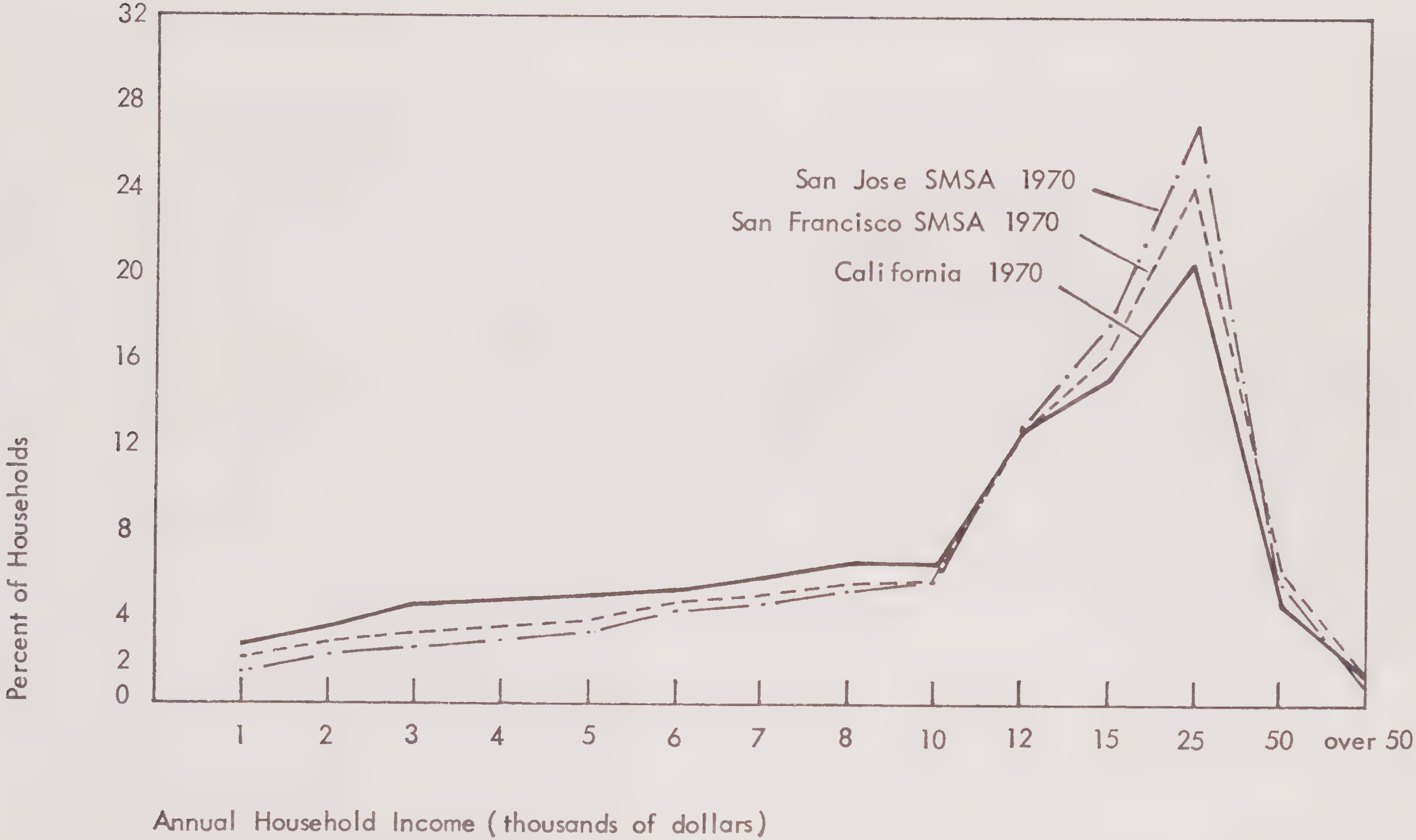
ESTIMATES OF DEVELOPED ACREAGE AND UNDEVELOPED ACREAGE
BY PLANNED LAND USE AND RESIDENTIAL DENSITY WITHIN AREAS SUBJECT TO FLOODING
FROM 18 EAST ZONE CREEKS DURING 100-YEAR FLOOD CONDITIONS
(Acres)

Planning Area	Developed: Urban Service Area	Undeveloped: Urban Service Area — Planned for Residential Use: Low	Medium Low	Medium High	Very High	Other[a]	Outside Urban Service Area	Totals
A. San Jose	270		130			800		1,200
B. Evergreen	2,120	240	1,310	280	190	140	30	4,310
C. Alum Rock	880		130			390		1,400
D. Berryessa	390					860		1,250
E. Milpitas	990	740				1,530		3,260
F. Alviso						1,630		1,630
G. Agnew	420					2,180		2,600
S. Edenvale	1,650		2,120	260		1,010	490	5,530
T. Coyote	80					160	4,480[b]	4,720
TOTALS	6,800	980	3,690	540	190	8,700	5,000	25,900

a. Includes planned commercial, industrial, and parkland uses. Also includes areas for which no plan exists.

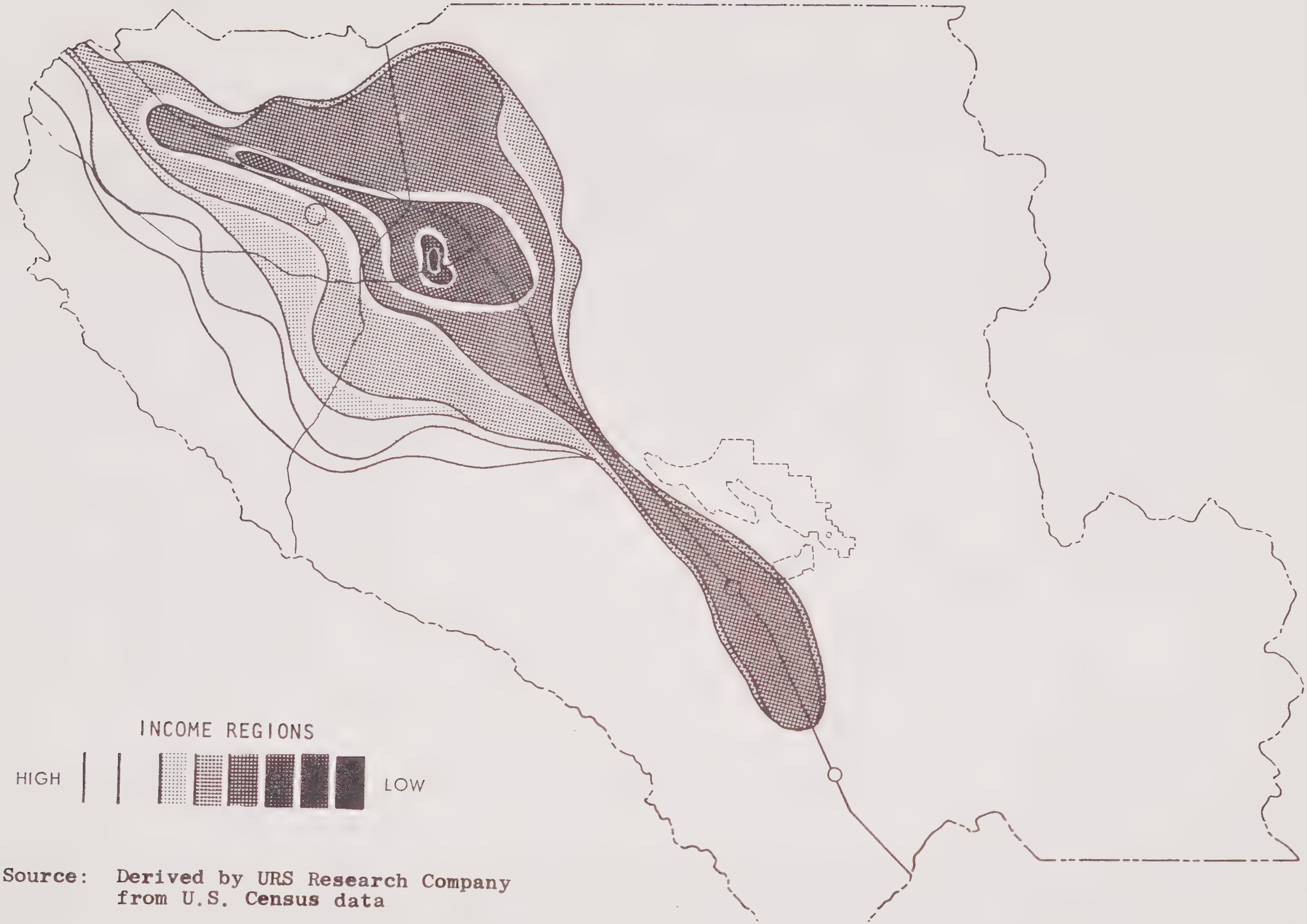
b. Unplanned undeveloped land.

Source: URS estimate using Santa Clara County "Existing Land Use - 1970," as updated by County Planning Department to 1973, planned land uses from the "General Plan 1966-2000: San Jose, California," the "General Plan, Milpitas, California," and the map of floodable areas appearing as Exhibit A.



Source: Derived by URS Research Company from U.S. Census

FIGURE III-28 AVERAGE ANNUAL HOUSEHOLD INCOMES IN THE SAN JOSE SMSA, 1970



Source: Derived by URS Research Company
from U.S. Census data

FIGURE III-29 GEOGRAPHICAL DISTRIBUTION OF INCOME IN THE SAN JOSE SMSA, 1970

Table III-22

MEDIAN HOUSE VALUES
IN SANTA CLARA COUNTY PLANNING AREAS
1970

Planning Area	Median House Value (1970 Dollars)
Subject to Flooding from East Zone Creeks	
A. San Jose	$23,800
B. Evergreen	22,000
C. Alum Rock	20,200
D. Berryessa	29,300
E. Milpitas	24,100
F. Alviso	21,200
G. Agnew	22,900
S. Edenvale	28,300
T. Coyote	29,300
Not Subject to Flooding from East Zone Creeks	
H. Santa Clara	23,400
I. Campbell	27,200
J. Los Gatos	29,900
K. Saratoga	n.a.
L. Cupertino	30,800
M. Sunnyvale	27,800
N. Mt. View - Los Altos	34,800
O. Palo Alto	34,100
P. Los Altos Hills	n.a.
Q. Lexington	23,400
R. Almaden	36,800

Table III-22 (continued)

MEDIAN HOUSE VALUES
IN SANTA CLARA COUNTY PLANNING AREAS
1970

Planning Area	Median House Value (1970 Dollars)
Not Subject to Flooding from East Zone Creeks	
(continued)	
U. Llagas-Uvas	$35,200
V. Morgan Hill	24,900
W. San Martin	25,500
X. Gilroy	22,400
Y. Diablo	21,100

Source: County of Santa Clara Planning Department, INFO, "Socioeconomic Indicators, Census Tracts and Planning Areas," April 1, 1970, Santa Clara County, pp. 16-56.

Finally, an estimate has been made of the total fair market value of the privately owned real property improvements (excluding land costs) which are within the floodable area. These estimates have been compiled not by planning area, but by the particular creeks which would be responsible for flooding these areas. This type of breakdown was used in order to facilitate the setting of priorities for the proposed creek improvements. Many factors were considered in establishing these priorities, but the key one was the amount of existing development to be affected. Exhibit M depicts these affected areas and Table III-23 lists the estimates of current fair market value.

Undeveloped Land

Referring again to Table III-21, it can be seen that the estimated 14,100 acres of undeveloped urban service land within the subject "floodable area" occurs mainly in the Evergreen, Milpitas, Alviso, Agnew and Edenvale Planning Areas. Considering first those undeveloped areas designated for residential use in the San Jose General Plan, we are concerned mainly with the Evergreen, Milpitas, and Edenvale Planning Areas.

In Evergreen, large blocks of undeveloped lands planned for residential development in "medium-low" density (5 to 7.9 units per net residential acre)* are located in the central portion of the planning area, generally east of Grant Road on the north and King Road on the south. Small areas planned for residential low density (0.2 to 4.9 units per net residential acre), medium-high density (8 to 17.9 units per net residential acre), and very high density (42 to 62 units per net residential acre) also exist in the Evergreen area.

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*Source: "The General Plan - 1966-2000: San Jose, California." "Net residential acre" is considered here to be 75 percent of gross acreage.

Table III-23

ESTIMATED 1973 FAIR MARKET VALUE OF TOTAL EXISTING PRIVATELY HELD REAL PROPERTY IMPROVEMENTS WITHIN FLOODABLE AREA
(Millions of 1973 Dollars)

Creek or Creek Section	Fair Market Value[a]
Berryessa	$128.092
Silver	234.556
N. Babb	1.970
Thompson (Quimby Road to Aborn Road)	18.008
Coyote (Hwy. 101 upstream to Metcalf Road)	82.168
Ruby	8.760
Quimby	32.636
Calera	12.349
Fowler	23.760
S. Babb	9.702
Coyote (Trimble Road to Silver Creek)	43.472
Lower Penitencia	25.840
Flint	12.752
Upper Penitencia	25.840
Los Coches	6.340
Coyote (Trimble Road to Bay)	33.600
Coyote (Silver Creek up to Hwy. 101)	8.150

Table III-23 (continued)

ESTIMATED 1973 FAIR MARKET VALUE OF TOTAL EXISTING PRIVATELY HELD REAL PROPERTY IMPROVEMENTS WITHIN FLOODABLE AREA
(Millions of 1973 Dollars)

Creek or Creek Section	Fair Market Value[a]
Evergreen	$ 2.305
Thompson (Aborn Road to urban reserve)	n.a.
Yerba Buena	0.508
Fisher	8.996
Coyote (Metcalf to dam)	n.a.
Thompson (from urban reserve east)	n.a.
TOTAL	$719.804

a. Defined as four times the assessed value listed by the County Assessor.

Source: Santa Clara County Flood Control and Water District

In Milpitas, 740 acres planned for residential low density development border a large core area which is planned for light industrial development and a civic center.

Of all the planning areas in the county, Edenvale has the largest number of acres subject to inundation from the project creeks. Nearly 2,400 open acres here are planned for eventual residential development, over 2,100 of this for medium-low density development.

Appraisers and real estate specialists experienced in sales of undeveloped lands on San Jose's east side suggest that the current market value for residential acreage in these areas is $12,000 to $13,000 per acre.

Large acreages of floodable undeveloped land are planned for industrial development in the Milpitas, Alviso, Agnew, and Edenvale Planning Areas. Essentially all of the 1,530 acres in Milpitas which are not planned for residential use are to be used for light industry or a large civic complex planned for the city. At least 800 acres in Alviso and essentially all of the 2,180 "other" acres (see Table III-21) listed for Agnew are also planned for industrial use. Finally, light industrial uses are planned for about 1,000 acres of floodable land along Monterey Road in the Edenvale area.

The Economy

Major areas of interest in terms of economic impacts of the proposed creek improvements are employment and property taxes. Significant employment gains might be expected in the construction industry as a result of this project. Rendering developed and undeveloped lands free from flood threat might increase the market value of those lands, and hence the county's tax base. It is pertinent, therefore, to examine trends in employment and taxes as a baseline for considering possible project impacts.

Trends in Employment

During the last decade, the total employment growth in Santa Clara County more than matched the increase in population. From an average of 228,000 persons in the civilian labor force in 1960, total employment increased 85 percent to an average of 421,200 by 1971. The pattern of the employment growth within the county is markedly similar to that of population in its concentration around the immediate San Jose area. Within San Jose, between 1960 and 1970, the population increased 118.3 percent and total civilian employment increased 118 percent.

As illustrated in Table III-24, between 1960 and 1971 Santa Clara County's employment grew much faster than that of either the San Francisco-Oakland SMSA (26.0 percent) or the Nine County Bay Area (37 percent). Growth rates have fluctuated, of course, with periods of rapid expansion, but overall the expansion in Santa Clara County has been extraordinarily strong.

A table is presented as Appendix F that shows trends in civilian employment in Santa Clara County for 1950-1970. This table reveals that the growth in employment has not been evently distributed among industries. Manufacturing ranked first, with average annual growth rates of approximately 22.3 percent between 1950 and 1960 and 7.8 percent between 1960 and 1970. The

predominance of the manufacturing growth was attributable to the durable goods sector -- primarily aerospace manufacturing, which accounted for 64.8 percent of all manufacturing growth. By 1969, the aerospace and electronics industries in the county had reached a peak and have been rather static since then.

Table III-24

TOTAL CIVILIAN EMPLOYMENT IN
SAN JOSE AND SANTA CLARA COUNTY
1960-1972

				Employment As Percent of Total Labor Force	
Year	Santa Clara County	San Francisco-Oakland SMSA	Nine Counties	Santa Clara County	Nine Counties
1960	228,000	1,091,800	1,426,800	6.3%	5.3%
1965	316,500	1,224,700	1,666,300	6.4	5.3
1966	347,400	1,274,300	1,754,300	5.1	4.6
1967	372,900	1,310,300	1,817,300	4.8	4.6
1968	397,000	1,356,800	1,894,300	4.4	4.1
1969	418,600	1,400,700	1,963,700	4.3	4.1
1970	423,700	1,390,900	1,968,100	6.0	5.3
1971	421,200	1,372,500	1,960,700	6.6	5.4
1972	n.a.	1,397,300	1,998,400	n.a.	5.1

n.a. = not available.

Source: State of California, Department of Human Resources Development.

Construction employment in Santa Clara County increased between 1950 and 1963 at a rapid rate, but has remained relatively static since 1963. The county growth in this employment category for 1950-1971 is shown below, in terms of thousands of jobs:

Year	000 Jobs	Year	000 Jobs
1950	7.7	1965	17.4
1955	11.5	1966	16.5
1960	15.3	1967	15.6
1961	16.0	1968	17.5
1962	16.8	1969	19.1
1963	19.3	1970	17.6

Source: Santa Clara County Planning Department: May 1972. Figures do not include force account and government construction workers.

Residential construction went through both a boom and bust condition in the 1960s in most of California and in Santa Clara County, where the annual total of new dwelling units authorized by building permits fluctuated rather widely. There was very little overall increase in the number of units constructed during the decade. Similarly, industrial, office, and commercial construction activity in Santa Clara County, and also in the Nine-County Bay Area, increased at a rather static rate between 1960 and 1971, although fluctuations occurred with conditions of demand and oversupply.

County Property Taxes

The total assessed valuation for tax purposes within Santa Clara County (its tax base) for Fiscal Year 1973-74 is $3,869,945,842. Freeing a significant portion of county land from flood threat might be expected to increase

this base somewhat. Average tax rates in east side areas can be generalized at $13 per $100 assessed valuation, for the purposes of discussion. Tax rates in Milpitas average closer to $14.50 per $100. The largest portion of the county property tax dollar goes to the schools. This proportion can be generalized at about two-thirds for the eastern part of the county.*

*Santa Clara County Tax Assessor's Office.

Agricultural Setting

The urban service portions of currently undeveloped floodable areas which are designated as agricultural land today are concentrated largely in the Berryessa, Agnew, and Evergreen Planning Areas. By far the greatest amount of such land in the Agnew and Evergreen areas is currently hay land or orchards, or is not being actively farmed. In Berryessa are located small flower growers, truck farms, and grape and cherry farms.

Of these agricultural land uses, only the small flower growers, the truck farmers, and the grape growers are considered to possess the economic viability and market strength to stay in the area for longer than five to ten years. It is expected, however, that (if allowed by public policy and if this becomes economically attractive), farmers with orchards, hay farms, and other types of crops besides those listed above may sell to developers in the not too distant future.* Farmers whose land is now covered by the Williamson Act are, of course, obliged to leave it in agricultural use for the next nine years. However, except for this degree of government intervention, which essentially acts to aid those who want to keep their land in agriculture, no government agency is expected to intervene in the foreseeable future to lock any county land north of the Coyote Planning Area into agricultural use.

The Coyote Planning Area is today used largely for agricultural purposes. Orchards and vineyards predominate. Although orchards are among the types of agriculture which are not expected to be economically strong enough to prevail over development pressures, such pressures may not be as strong in this area as in others which are within the urban services area, for reasons which are discussed elsewhere in the economic portions of this study.

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* Source: Office of the County Director, Cooperative Agricultural Extension, University of California, San Jose and "Santa Clara County Agriculture - A Look at Its Future," Published by the Cooperative Agricultural Extension in June 1972.

Transportation

The project area encompasses a variety of transportation services, including an extensive highway and street network, an airport, and railroads.

Highway and Street Network

The principal East Zone highway routes include the Almaden Expressway, Monterey Road, Senter Road, U.S. 101 (Bayshore Freeway), Capitol Avenue, and the Nimitz Freeway in a general north-south direction, and Capitol Expressway, Tully Road, Story Road, Sinclair Freeway (now under construction), McKee Road, Montague Expressway and the Alviso-Milpitas Road in an east-west direction (see Exhibit N).

The project will have a direct effect on 149 existing roadway-stream crossings, ranging from bridges to culverts. A large number (99) of these will not be disturbed by the proposed improvements, but some 50 will need to be relocated or reconstructed.

Railroads

As indicated on Exhibit O, approximately 6 miles of main-line railroad traverse the project area. The Southern Pacific Transportation Company has an extensive system servicing the county and the Western Pacific Railroad Company supplies additional industrial service. Eight railroad structures cross the streams to be improved, and five of these will require reconstruction.

A listing of all highway and railroad crossings of creeks in the East Zone is provided in Appendix G.

Airports

Only the Reed-Hillview Airport, a private general aviation facility, is located within the project area. It will not be disturbed by the proposed improvements.

Urban Utilities and Services

Exhibit P indicates the distribution of principal electric transmission and gas pipeline routes, and Exhibit Q shows the water treatment and distribution system in the East Zone of the District. Present and planned utility facilities are included.

Exhibit R shows the educational facilities now available and those planned for the near future.

A discussion follows relating each of these utilities and services to the creeks involved in the project and their proposed flood control improvements.

Electrical Distribution System

As indicated on Exhibit P, numerous 60 and 115 KV lines traverse the project area. In addition, two 230 KV lines and one 500 KV line cross Coyote Creek just south of Metcalf Road. There are no underground installations of these high voltage lines within the project area.

Pipelines

The Pacific Gas and Electric Company (PG&E) operates three transmission lines and several distribution trunk mains within the area (see Exhibit P). In addition, the Southern Pacific Transportation Company operates a 10-inch oil pipeline, generally following its eastern route from the north to a terminal near Trimble Road east of the Nimitz Freeway and also servicing the Shell Oil company refinery. Three reserve or emergency lines cross Coyote Creek.

The Southern Pacific pipeline crosses Calera, Berryessa, and Lower Penitencia creeks near Main Street in Milpitas. Earth channels with box culverts under the street crossings are planned for the sections of Calera and Berryessa Creeks involved. Lower Penitencia Creek is not to be improved where the pipeline crosses it.

The PG&E transmission mains cross Upper Penitencia Creek between Capitol Avenue and King Road. An earth channel is proposed at this crossing.

One PG&E distribution trunk main crosses Coyote Creek near Mabury Road, one near Story Road, and two near Tully Road. An earth channel will be constructed at the Mabury crossing, while the other crossings will be natural channels.

Water Distribution System

Exhibit Q shows that the principal water supply lines within the project area are the South Bay Aqueduct/Central Pipeline and the Evergreen Pipeline (now under construction). Several canals also service the area.

Education

Forty elementary schools in nine school districts, and two high schools in the Eastside Union High School District are now located within the present floodable area. Five more elementary school sites have been selected within the area. The western boundary of the Milpitas Junior College site is near but not in the floodable area.

The following is a list of schools in the floodable area. Numbers refer to those on Exhibit R.

Schools in the Floodable Area

Elementary Schools and Sites

36 Anne Darling, San Jose
37 Empire Gardens, San Jose
56 Terrell, San Jose
76 C. Arbuckle, Alum Rock
77 Cassell, Alum Rock
80 A.J. Dorsa, Alum Rock
83 M.K. Goss, Alum Rock
84 O.S. Hubbard, Alum Rock
87 Lee Mathson, Alum Rock
88 Mayfair, Alum Rock
90 Meyer, Alum Rock
91 Miller, Alum Rock
95 Wm. Rogers, Alum Rock
96 Thomas Ryan, Alum Rock
97 San Antonio, Alum Rock
100 Sloanaker, Alum Rock
102 (Site), Alum Rock
103 (Site), Alum Rock
107 Morrill, Berryessa
109 Northwood, Berryessa
186 Briggs (Site), Evergreen
188 Cedar Grove, Evergreen
190 Holly Oak, Evergreen
193 Smith, Evergreen
194 Whaley, Evergreen
195 (Site), Evergreen
243 Abel, Milpitas
246 Curtner, Milpitas
248 Pomeroy, Milpitas
252 Russell, Milpitas
254 Spangler, Milpitas
255 Topham (Site), Milpitas
257 Zanker, Milpitas
258 (Site), Milpitas
261 Milpitas, Milpitas
280 Encinal, Morgan Hill Unified
301 Robert Sanders, Mt. Pleasant
302 Valle Vista, Mt. Pleasant
304 Anderson, Oak Grove
306 Calera, Oak Grove
308 Davis, Oak Grove
311 Edenvale, Oak Grove
312 Frost, Oak Grove
315 Miner, Oak Grove
316 Oak Grove, Oak Grove
319 Stipe, Oak Grove

High Schools

Oak Grove, Eastside Union
Overfelt, Eastside Union

Scenic and Recreational Setting

As recently as 1956 the Santa Clara Valley was described as "one of the most beautiful in the world" in the book America's 50 Best Cities (by N.D. Ford). However, in the intervening years, urbanization of the valley has resulted in the conversion to mixed urban uses of much scenic open orchard and other agricultural land. Although the relatively undeveloped eastern hills of the valley still provide a valuable scenic resource, the open, agricultural character of the northern valley floor has been largely fragmented and lost as a dominant and positive quality.

In the East Zone study area, much of the land in and immediately east of the City of San Jose is characterized by this pattern of scattered development, including areas adjacent to portions of Upper Berryessa, Upper Penitencia, Lower Silver, North Babb, South Babb, Ruby, Flint, Quimby, Thompson, and Coyote creeks. In Milpitas, areas adjacent to portions of Calera, Los Coches, and Lower Penitencia creeks are also characterized by this condition. However, even where the natural character of the creek environments has been compromised by adjacent development, many portions of the creeks themselves have retained a well-defined and distinct natural character, frequently accented by a mature tree canopy. This condition prevails for much of Coyote Creek north of about Bernal Road, and for at least the upper reaches of the project channels which originate in the eastern hills, notably Yerba Buena, Evergreen, Thompson, South Babb, Upper Penitencia, Berryessa, and Los Coches creeks.

The upper portion of Coyote Creek and portions of several channels between the hills and Thompson Creek cross the relatively flat valley floor through mixed agricultural and, to the north, residential uses. These channels are generally poorly defined, and their natural, scenic, riparian character is inconspicuous. This condition characterizes several project channels in the Alum Rock and Evergreen areas, notably the lower reaches of Evergreen, Thompson, Fowler, Quimby, and Ruby creeks.

Recognition of the recreational value of scenic streamside areas has been accomplished through the planning designation, and at least partial public acquisition, of lands adjacent to portions of several project channels for parks and park chains. The most extensive and advanced of these proposals are for Coyote Creek Park and Penitencia Creek Park, although several others are in various stages of consideration by cognizant public authorities.

Because the discussion of the existing visual and recreational status of the project channels is inseparable from that of the impacts of the proposed improvements, the existing setting is presented in more detail in the impacts section of this report. The parks and park chains are also discussed in their planning context in the section on community goals and plans.

Archaeological and Historic Setting

An archaeological reconnaissance was performed by archaeologists associated with the Adan E. Treganza Anthropology Museum, California State University, San Francisco. The full report of their reconnaissance is included in Volume 2 as Appendix H.

Eleven archaeological sites were located in the project area either from existing reports or from the site survey. Five of these sites were on record with the Archaeological Research Facility of the University of California, Berkeley, five had previously been reported by a local archaeologist, and one was found during the survey of the creek floodplains in the project area. One site lies near the upper end of the area on Calera Creek, one in the Lower Penitencia Creek area, six within two miles upstream of the U.S. 101 crossing of Coyote Creek, one in the middle portion of the middle reach of Thompson Creek (near San Felipe Road), and one site on Fisher Creek southwest of Coyote. One site was recorded along Mt. Hamilton Road but above the floodplain and project area.

No excavations were made during the survey, but surface inspection was undertaken with the intention that trial excavations would be made later, when design details and construction schedules are available, to define the extent and significance of the sites more precisely.

The archaeological and historic sites in the project area are indicated on Exhibit S.

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E. Related Projects, Existing and Planned

A number of existing or planned projects, both public and private, should be examined for possible beneficial or adverse cumulative impacts. Projects that are directly related to the proposed project are: (1) The Norwood Creek flood control project; (2) Lake Cunningham; (3) the Coyote Park chain; (4) the Penitencia Park chain; (5) the District's Bay Front Levee Flood Control Project; and (6) the District's Rainfall Augmentation Program. Norwood Creek is tributary to Thompson Creek and the flood control project proposed for Norwood is directly related to the flood control project for the East Zone. Lake Cunningham is proposed as a combined flood control and regional recreation facility located at the confluences of Flint and Ruby Creeks with Thompson Creek. The Coyote Park chain is a proposed linear park along Coyote Creek from Kelly Park to Lake Anderson Dam. The Penitencia Creek Park chain is planned to extend from Capitol Expressway to Alum Rock Park and includes the Educational Park project of the East Side Union High School District. The Bay Front Levee project involves the installation of levees along the South Bay to provide protection against tidal and/or storm flooding. Construction may start in two to three years. The Rainfall Augmentation Program (e.g., cloud seeding) has been in existence for 15 years and is expected to continue.

So many other projects are related to the proposed project through possible cumulative indirect or growth-inducing effects that no attempt will be made here to describe or list them. Suffice it to say that these projects generally pertain to population growth and/or distribution, and to urbanization of the region.

VOLUME I . . .

Section IV

ENVIRONMENTAL IMPACTS OF
PROPOSED PROJECT

IV ENVIRONMENTAL IMPACTS OF PROPOSED PROJECT

A. Physical Impacts

Geologic Hazards

The major geologic hazard associated with the project is the possibility of flooding and sediment damage if a channel or sediment retention structure fails during a seismic event (earthquake) when the channel or structure is full of water. The Uniform Building Code, 1970, lists the entire state as being susceptible to moderate to major earthquake damage. The project site lies close to two major active fault zones (Hayward-Calavaras and San Andreas) and a fault of questionable activity (Silver Creek) is buried beneath valley sediments. Because of the potential for fault-related damage, careful planning and design must be conducted, particularly where improvements cross suspected faults or construction of retention structures is involved.

Properly constructed, the various types of channel improvements should not be subject to severe damage as a result of ground shaking. Such improvements are endangered primarily by displacement due to fissuring of the ground surface. As described in Section III, there are indications of fault traces buried beneath the valley sediments. Generally speaking, little information exists regarding the actual nature or activity of these faults. Most are considered inactive; about others, such as the Silver Creek Fault, there is considerable controversy with regard to activity. However, areas of possible displacement should be avoided if possible. The common practice in questionable areas is to employ trenching and detailed geologic analysis to determine the actual conditions and construction techniques required.

The earth fill sediment-retention structures planned along the base of the foothills may be susceptible both to shaking and to surface rupture. Property immediately downstream from these structures would therefore be vulnerable to severe flooding and sediment damage should a structure fail. Preliminary mapping indicates possible faults in the vicinity of the proposed structures; additional detailed mapping should be undertaken to verify the safety of the site. Proper dam design criteria and emplacement practices must include measures to resist reaction to ground shaking. Construction over established surface ruptures should be avoided.

Ground response to shaking during an earthquake must also be considered. This is particularly true where improvements are constructed on thick, weak, clayey materials or where there is groundwater saturation; such areas may be subject to exaggerated ground acceleration, liquefaction and settlement. Improvements proposed for the baylands area are minimal and are not anticipated to cause downstream hazards in the event of a failure. In the Lake Cunningham and Laguna Seca areas, special design criteria must be included to compensate for possible seismic response.

In addition, the improvements along the northeast edge of the valley should receive special study. In 1972, Earth Science Associates mapped several discontinuous faults along the boundary of the valley sediments. Linear projections of the mapped faults cross certain sections of the proposed project. Areas of particular concern include the upper improvements on Berryessa and Los Coches creeks. Other intersections of possible fault traces and parts of the project occur, but only where minimal improvements are proposed. Although earthquake damage should be considered in all cases, its potential significance is less in these cases.

Hydrologic Impacts

Implementation of the proposed project will result in a variety of inter-related hydrologic-geologic impacts, some beneficial in nature and some adverse. The following impacts will be discussed on both a long- and a short-term basis, as appropriate.

Beneficial Impacts

Perhaps the outstanding beneficial impact of the project is implicit in its goal -- to provide a high degree of flood protection (degree of safety, 99 percent) to existing and future developments in the East Zone. Under present conditions, a flood of the 100-year design magnitude could result in extensive damage, possibly including loss of life. Substantial recent urbanization and partial channelization in the East Zone have aggravated this condition by increasing total runoff and accelerating runoff rates. These factors, combined with the demand for further growth, compound the inadequacies of the existing drainage system. Construction of the improvements will greatly reduce future flooding hazards.

Within the Coyote Narrows, in the Fisher Creek drainage basin, and in the general area between Anderson Lake and Metcalf Road, a high water table condition exists. This situation is controlled in large part through diversion of stream flow into the Evergreen Canal. However, in certain areas, the situation commonly results in surface inundation as the water table surfaces. Water tables encroaching on root zones kill plants and greatly compound construction problems. A solution frequently used by local farmers is to pump to lower the water table. Flood control improvements should alleviate this condition to some degree. The Fisher Creek improvements, for instance, will include excavated earth channels in many reaches where the water table is high. By increasing the depth of these channels, additional drainage for the surface aquifers will be provided, thus aiding in the subsurface maintenance of a lowered water table.

Adverse Impacts

Modified floodplains and levees are planned along many reaches, wherever sufficient right-of-way is available and the land is relatively undeveloped. The concept of a modified floodplain is desirable because it maintains creeks in a somewhat natural condition. At certain locations, however, drainage consisting of overland flow or collected and concentrated flow may be blocked by levees. Examples of such situations include the (up to) 9-foot-high levees upstream from station 1135 on Coyote Creek, drainage from the Transamerica property between stations 55 and 68 on Upper Penitencia Creek, and drainage between reaches 3 to 8 on Thompson Creek. As presently designed, water surfaces within levees are significantly higher locally than the elevations of surrounding lands, which results in potentially serious drainage problems. These problems can be resolved during final design in cooperation with local public works agencies. Similar drainage difficulties may be expected to exist any place where fills are placed that do not conform appropriately with surrounding elevations.

The proposed 300-acre Lake Cunningham is near the confluence of Silver Norwood, Ruby, and Flint creeks -- indeed, some of these streams pass through the lake. If the lake is constructed before the upstream flood control improvements are installed, sediments and other wastes generated by flood control construction activities may be deposited in the lake, significantly shortening its expected life and/or resulting in increased maintenance costs.

On a short-term basis, Lake Cunningham can be expected to function as a sedimentation basin for stream-borne sediments derived from construction and the surrounding hills. As future urbanization and sediment control structures are placed upstream, the total sediment load will doubtless be reduced. Under these circumstances, the flood control modifications should have a negligible long-term effect on Lake Cunningham.

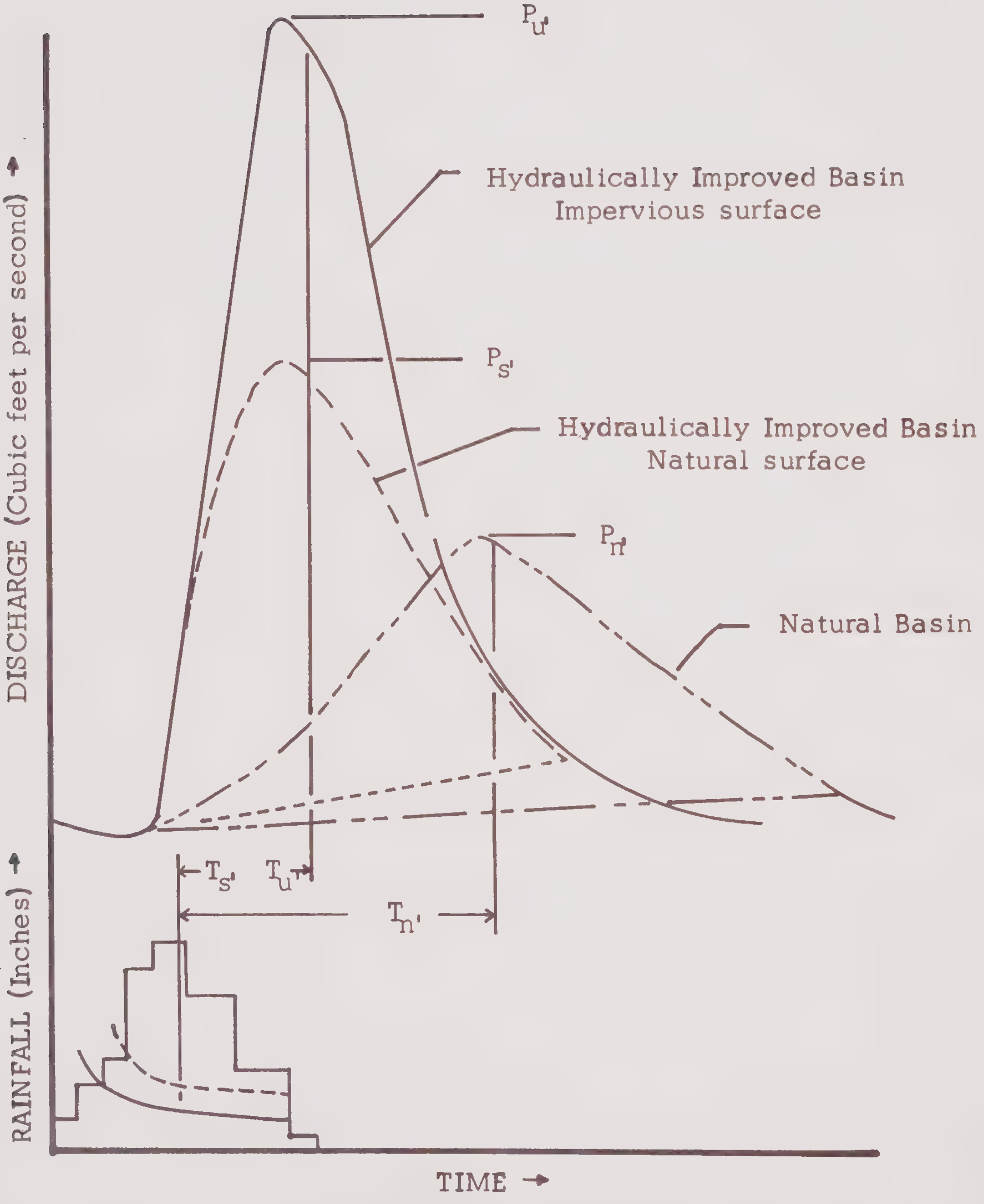
Portions of channels abandoned because of straightening, enclosed low areas between embankments and roads, etc. provide sites for ponding and stagnation. Examples of such spots that will be created under the proposed plan include the area between stations 45 and 47 on Upper Penitencia Creek (abandon channel) and the fill along Ruby Creek between stations 29 and 31 (entrapment along White Road). Possible standing water and associated public health problems may also occur periodically.

The proposed flood control improvements will significantly modify the hydraulic characteristics of the basin discharge. Parameters thus modified will include peak flow, basin response time, and frequency of floodflow.

Hydraulic changes can be attributed to the channel modifications themselves as well as to the increasing urbanization of the area. Figure IV-1 is a schematic drawing illustrating the effect of such modifications on a typical flood hydrograph and basin lag time. As can be seen, hydraulically improving the channels greatly reduces the time of concentration (lag time) and increases the flood discharge, while the total runoff remains much the same. As urbanization creates additional impervious cover, both total runoff and peak discharge increase significantly.

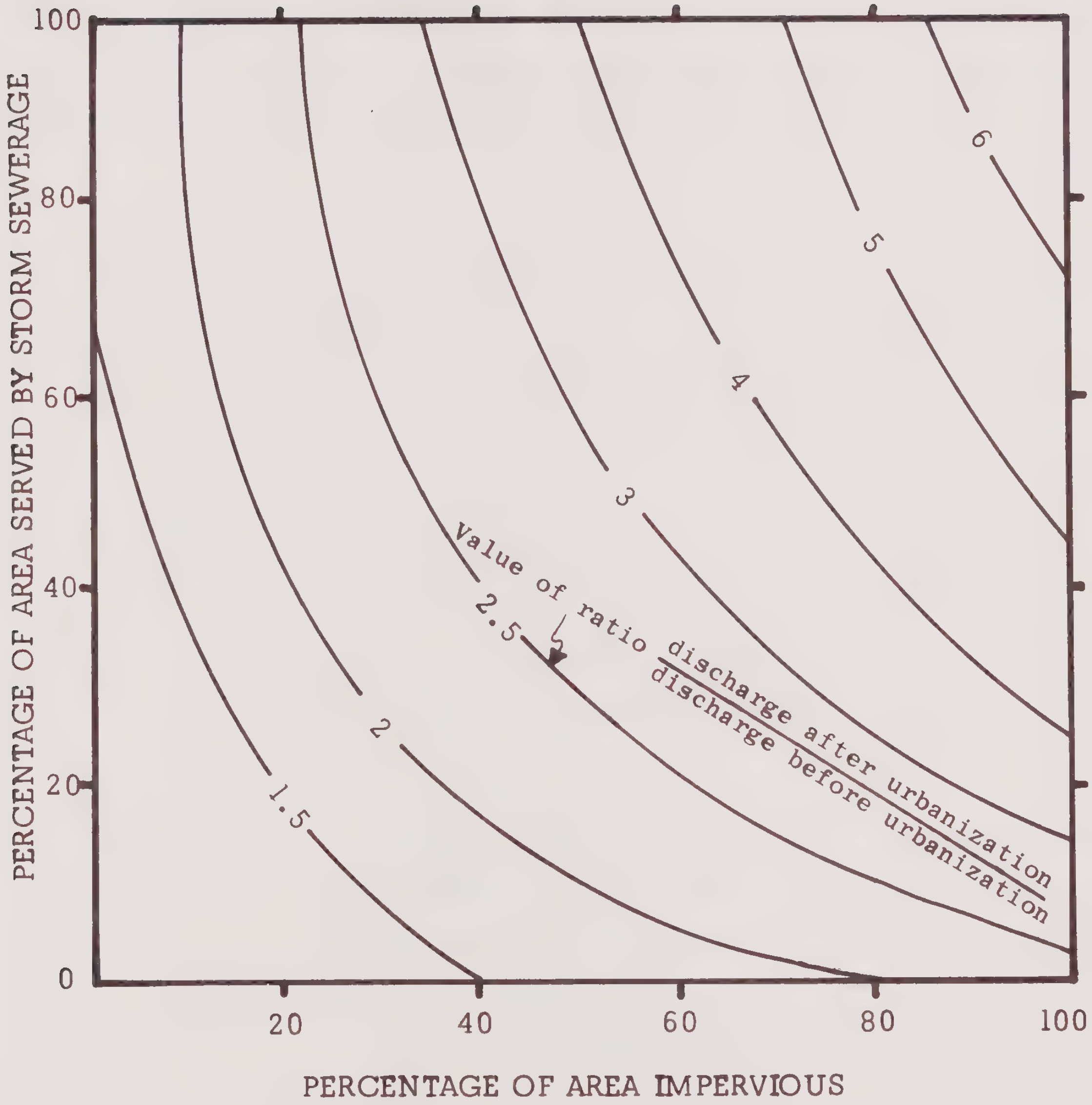
The extent of the effect of urbanization is illustrated in Figure IV-2. The ratio of pre- to posturbanization is developed by comparing impervious area to degree of storm sewerage.

Although these figures may not be extrapolated directly to the East Zone, they indicate the expected effect of modifications. It is apparent that the improvements and expanding urbanization will increase the frequency and peak flow rates. Due to elevated velocities, the hydrograph time base will be shortened. Primary concern in the flood control design must be given to the areas of stream confluence where individual flows are magnified. The design standard is the 100-year flood. Calculation of such a flood includes consideration of projected urban expansion. Even if the



Source: Proceedings, Conference on Urban Runoff Management Problems, University of Kentucky, NTIS, U.S. Department of Commerce, June 1972.

FIGURE IV-1 EFFECT OF URBAN DEVELOPMENT ON FLOOD HYDROGRAPH AND BASIN LAG TIME (Not to scale) T_n', T_s' and T_u' are lag times; P_n' P_s' and P_u' are flood peaks of the hydrographs.



Source: Leopold, L.B.,"Hydrology for Urban Land Planning," U.S.G.S. Circular 554, 1968.

FIGURE IV-2 EFFECT OF URBANIZATION ON MEAN ANNUAL FLOOD FOR A 1-SQUARE-MILE DRAINAGE AREA

frequencies, response times, peak rates, and time of concentrations are altered for smaller floods, the capacity of the system should not be exceeded.

The proposed improvements do not provide absolute flood protection, as a flood exceeding the design criteria could conceivably occur. The probability of such an occurrence is very small, however, and the current design should provide a large degree of safety. Therefore the modification of the hydraulic regime may be considered to be insignificant.

There are many parks along some of the creeks, and parks may be created in floodplain areas in the future. The most important park and recreational areas are located along Coyote Creek; these include Kelley Park, the Japanese Gardens, Fred Watson Park, Coyote River Parkway, and William Street Park. Increased discharges, even as a result of minor storms, increase the probability of flooding in these areas. Flooding in such areas may result in destruction of landscaping, deposition of sediment and debris, and creation of standing water bodies -- all highly undesirable effects. Levees constructed along the creek to protect areas within floodplains from flooding often have undesirable aesthetic impacts. Such impacts, however, can be mitigated relatively easily.

The proposed flood control improvements will modify the process of groundwater recharge somewhat, but a major adverse impact is not anticipated. However, as any change in the groundwater recharge could have significant consequences in terms of water supply and land subsidence, this matter must be given serious consideration.

Water table aquifers (also called unconfined aquifers) are the topmost water-bearing formations which have a free surface or which are not under pressure and accept direct rainwater recharge from the ground surface. In contrast, a confined aquifer does not accept direct recharge from the ground surface due to the existence of an impermeable or a relatively impermeable layer above it. Confined aquifers accept recharge only in areas where they

are open to the atmosphere, or by artificial means. In the northern Santa Clara valley, natural confined aquifer recharge occurs principally in what is called the "forebay" zones. These are areas (principally near the valley borders) where the geological formations comprising the aquifers intercept the ground surface. Water percolated through stream beds or constructed percolation ponds in the forebay area thus enters the confined aquifer and becomes part of the groundwater system.

Overdraft of water from the confined aquifer has resulted in subsidence, but the phenomenon is a complex one (the reader is referred to the discussion of this subject in Section III-B). Pumping or withdrawal of water from the unconfined aquifer has an insignificant effect on land subsidence, although the flow of water from the unconfined aquifer into the confined aquifer may be reduced.

Planned channel lining in the forebay or confined aquifer recharge zones will restrict an unquantifiable amount of stream bed recharge capacity. The areas of primary concern include modifications to the upstream sections of Upper Penitencia, South Babb, Flint, Ruby, Quimby, and Fowler Creeks and to a section of Yerba Buena Creek. However, except for Upper Penitencia Creek, these creeks have a very seasonal flow, and the loss of recharge capacity is considered minimal. Suggestions regarding the minimizing of this recharge loss are presented in the section on mitigating measures and their incorporation into project planning is recommended. Similar modifications to channels in the pressure zone are not anticipated to have significant effects on the confined aquifer.

Other recharging channels in the forebay include certain portions of Thompson, Silver, and Upper Penitencia Creeks. For the most part, modified floodplains with levees on both sides are planned along these creeks; the project will disturb these recharge zones very little. Recharging streambeds and percolation ponds along the creeks might, however, be

plugged up due to sediment generation during and after construction. Extensive excavation and fill operations, spillage, and unstabilized embankments immediately following construction may present some hazards, although heavy floods may flush and wash the streambed sands. Good construction management and maintenance practices must be employed, in order not to reduce the percolation rates over the existing recharge grounds.

Installation of flood control improvements will curtail the recharge to the water table aquifer, but not to a significant degree considering current uses of this water and other trends such as conversion of agricultural lands to other uses. Not enough information is available to permit making accurate estimates of the amount of recharge so lost, but the process can be easily explained. Water confined to shallow and small creeks will not be able to spread out over orchards and agricultural lands. The water will quickly run off to the bay, rather than standing in the valley and infiltrating into the ground. As a result, recharge to the water table aquifer will be reduced, although rainfall in the fields will still infiltrate into the ground.

Due to its poor quality, the water table or unconfined aquifer is now used principally for agricultural purposes. Reduced infiltration will lower water table elevations and may increase farmers' pumping costs. Lowering of the water table may also invite contamination by connate waters. However, this impact is significant only for certain farmlands located in the basin, and it will last only as long as urban growth has not taken place. Urban growth will eliminate the need for irrigation water except as required for lawns and parks, and this will probably be supplied from other sources. Thus, no significant harm will result from curtailment of recharge to the unconfined aquifer in the basin.

Flood control improvements will prevent the periodic natural supply of water to agricultural and orchard lands. Also, local soil compaction associated with levees will reduce the transmittance of groundwater from the streambeds to adjacent areas. The fertility and wetness of these lands will be somewhat reduced as a result, and additional irrigation may be needed in such areas. Such impacts will be felt only as long as the adjacent farmlands are preserved.

The schedule of construction for this complex flood control project, involving many creeks, should be based upon the following premises, as far as possible:

1. Improvements should proceed from downstream creek ends toward the upstream ends and progressively along each tributary, to avoid the damaging effects of floods in low-lying lands. Upstream improvements will increase the volume of runoff, with the possibility of large flood peaks down streams. If downstream improvements are not in place or are constructed later, flooding, overtopping of downstream bridges and crossings, breaches in channel banks, and other damage may result.

2. The construction schedule should "fit" the schedules for other regional projects proposed by other governmental agencies. This will avoid multiple disturbance of the same area and may be economical. For example, construction of Lake Cunningham and the flood improvements in its vicinity could be coordinated.

In making hydrologic and hydraulic assessments for any flood control project, the following recommendations of the U.S. Bureau of Reclamation should be considered:

1. The cost/benefit ratio should be favorable as compared to alternative means of obtaining similar benefits, and in the light of public interest.

2. Temporary storage must be sufficient to lower the major peak flows or to decrease the frequency of minor floods.

3. So far as is practicable, the method of flood control should be automatic rather than manual.

4. Any flood control improvement must be effective. An implied downstream safety that does not exist is more dangerous than having no control at all.

No explicit statement on environmental impacts is included in these four statements, which were written in 1960, when environmental concerns were not paramount. Nevertheless, these recommendations are still valid. Item 2 is complied with in the project design, but Item 3 is fully applicable, because no operation of gates and outlets is involved. Item 4 has been considered as part of the design and has been commented upon in this report. With regard to Item 1, the recommended improvements and alternatives considered for this project seem to ignore the evaluation of the cost of control relative to the benefits to be derived through the reduction of potential damage.

Erosion and Sedimentation

Erosion and sedimentation are part of the natural environment of an area. As in the case of flooding, sediment problems become of concern only when man is affected. Sediment problems of sufficient magnitude to influence man are generally directly related to human land use activity. Although the most severe problems are usually related to construction activities, changes in sediment yields after an area has stabilized can also be significant. This is particularly true in light of increasing public concern involving aesthetic and water qualities. Some effects of land use activities on sediment yield are indicated in the following tabulation.

Effect of Land-Use Sequence On Relative Sediment Yield and Channel Stability

Land-Use Sequence	Sediment Yield	Channel Stability
Natural forest or grassland	Low	Relatively stable with some bank erosion
Heavily grazed areas	Low to Moderate	Somewhat less stable
Cropping	Moderate to Heavy	Some aggradation and increased bank erosion
Retirement of land from cropping	Low to Moderate	Increased stability
Urban construction	Very Heavy	Rapid aggradation and some bank erosion
Stabilization	Moderate	Degradation and severe bank erosion
Stable urban	Low to Moderate	Relatively stable

Source: Derived by URS Research Company from Wolman, M.G. and Schick, A.P., "Effects of Construction in Fluvial Sediment, Urban and Suburban Areas of Maryland," Water Resources Research, Vol. 3, No. 2, 1967.

As the project progresses and the resultant growth in urbanization of the area takes place, increases in total discharge, discharge frequency, and discharge velocity will occur which in turn will tend to accelerate channel and bank erosion processes. Sheet, rill and gully erosion from disturbed or unprotected channel banks and surrounding areas can be expected. Such erosion will increase the sediment production during the construction and recovery period. It should be noted that sediment production will fluctuate both geographically and time-wise in response to project phasing.

On a long-term basis (postrecovery), channelization of the flood discharge system will have the beneficial impact of reducing total sediment yield, with proper maintenance. Although impossible to quantify, this is considered a significant long-term impact.

Innumerable physical side effects of induced receiving water turbidity and sedimentation can be expected. The following discussion deals with major impacts normally associated with such accelerated processes.

When the transport capacity of a stream is exceeded by the input supply, sedimentation occurs. Deposition of sediments reduces the flow capacity of the channels and may plug natural and manmade drains. This is undesirable for a number of reasons. Loss of channel capacity reduces flood protection, and structures spanning the channels are more subject to failure during flood discharges. Maintenance costs are multiplied and aesthetic qualities are impaired. In addition, public health may be affected. Mosquito abatement measures may be ineffective due to channel filling. Toxic materials commonly associated with urban runoff tend to be absorbed onto sedimentary particles, particularly in the smaller size ranges. Selective transport and sorting may concentrate these materials in local areas. The absorption process also encourages transport of toxic materials to the baylands.

Much of the sediment entering the flood control network will eventually be transported to South San Francisco Bay. This is particularly true of the finer suspended loads. Such material will be deposited primarily in the flocculation zone, and eventually will be reworked and moved to other sites in the bay. Shoaling and navigational hazards will be increased in some parts of the bay. During periods of extreme discharge, direct biological effects may be experienced. Although impossible to quantify, the magnitude of project-related sedimentation here may be related to recent sedimentation in the area, as described in Section III.

Short-Term Impacts

Preparation of the land for channel improvements will require clearing, grading, digging for foundations, and some landscaping. Such construction involves removal of natural cover and soil surface disruption -- in some parts of the country small areas where similar construction has taken place have been observed to undergo accelerated erosion, in extreme cases some 20,000 to 40,000 times the loss from the site in a natural state during an equivalent period.* These figures represent extreme cases of soil loss and are probably several orders of magnitude larger than should be expected in the Santa Clara Valley.

Most of the potential sediment movement can be attributed to rill, gully, and stream channel mechanisms in areas at and immediately downhill from the construction. Sediment entering a dry channel will not be transported, and may be effectively removed. If exposed to storm flow, downstream effects of such material may be great. If the construction debris

*Wolman, M.G., "Problems Posed by Sediment Derived from Construction Activities in Maryland," Report to Maryland Water Pollution Control Commission, 1964.

enters perennial channels, sediment transport will be high, but shock-loading will be less than previously described. The short-term soil loss will therefore depend on construction techniques and in particular on the season of exposure (i.e., rainfall). As developed in Appendix I, application of the universal soil-loss equation for a typical East Zone soil provides an indication of erosion acceleration under varying conditions. Increases in sediment generation on the order of several hundred times may result if construction and recovery occurs during wet weather. Erosion losses during dry conditions would be greatly reduced (it is impossible to estimate this reduction quantitatively).

Spread over the anticipated construction period and geographic extent of the project, such sediment yield increases can contribute significantly to maintenance costs. As the proposed construction would proceed from downstream to upstream, each successive maintenance operation would be over an increased area and would require extra effort.

Estimates provided by the District indicate a cut versus fill overbalance of several million cubic yards during the construction period. A breakdown of cut-fill estimates is presented in Table IV-1. During the initial four-year construction period some 3/4 million cubic yards of excess or spoil material will be generated. During the 1980-1985 period there will be a slight deficiency of some 32,000 cubic yards. Finally, during the remaining period some 1.4 million cubic yards of excess material will be produced. Of this spoil, only part will be suitable as fill and topsoil. In any case, the excess must be removed from the right-of-way area to some suitable disposal or stockpile site(s). Selection of the required receiving areas has not yet been made.

During the process of excess material disposal and stockpiling, a certain amount of material will be lost along the haul routes. If as

little as 0.01 percent of the total material moved is lost to spillage, more than 200 cubic yards of material could be deposited along the routes. This is a relatively minor figure when spread over the entire construction period, but this material will be concentrated along certain roads and will present a temporary undesirable aesthetic appearance and increase maintenance problems.

Unless it is protected, material placed in disposal sites or stockpiles will be subject to wind and rain erosion. Again, while generally minor, such additional sediment production could result in some problems. Locally, particularly in the upper Coyote Creek area, sediment generated through construction may cause some clogging of the confined aquifer recharge areas. As this situation may be largely controlled through use of proper engineering practices, this impact is not anticipated to be significant.

Table IV-1

ESTIMATED CUT AND FILL
DURING PROJECT CONSTRUCTION PERIODS
(Cubic Yards)

	1976-1980[a]	1980-1985	1985-[a]	Total
Cut	1,008,000	1,955,000	1,388,000	4,351,000
Fill	217,000	1,987,000	17,000	2,221,000
Differential	791,000	(-)32,000[b]	1,371,000	2,130,000

a. Data for corresponding sections of Coyote Creek unavailable.
b. - indicates deficiency.

Source: Santa Clara County Flood Control and Water District.

Long-Term Impacts

Depositional and channel degradation problems should decrease in the long run when the project is complete, construction activities have ceased, and levees and channel sides have been relatively stabilized. Also, with the expected growth in the valley, stabilization of channel sections, and curtailment of ploughing and tilling, the gross sediment generation from the valley portion of watershed should decrease. A lessening of agricultural activities will reduce the application of fertilizers and insecticides and will modify the quality of the runoff. However, urban runoff carries pollutants generated by motor vehicles, commercial activities, and so on. Water quality aspects of the improvement are discussed elsewhere in the report. The following sedimentation impacts can be associated with particular aspects of the improvements.

Sediment control facilities. The sediment control facilities located at breaks in grade between hills and valleys in some creeks will trap a large portion of the sediments eroded from the hills, reducing sediment supply from these areas. Fine sediments not retained in these structures will be confined in channels and pipes rather than spreading out on the floodplains. Although agricultural soils are supplied and refreshed through this mechanism, the shifting land use eliminates any associated impacts.

In order to function efficiently, proper maintenance of these basins is required. In addition to the increased maintenance costs incurred, the dredged material must be disposed of. Current planning has not incorporated disposal sites for this material. Costs associated with basin maintenance will almost surely be balanced by reductions in downstream load and cleanup costs required in that area. For this reason, the impact of sediment control facilities on the total project is considered beneficial.

Pipes and "armored" channels. Within pipes and concrete- and rock-lined channels, erosion is effectively eliminated and maintenance efficiency is increased.

Coyote low-flow channel. Addition of the low-flow channel within the lower reaches of Coyote Creek can be expected to modify sedimentary characteristics during periods of high discharge. Existing channels and vegetated marshes have relatively effective sediment impounding and filtering properties. Within the overflow channel these areas are bypassed and greater hydraulic efficiency or carrying capacity is maintained. Because of this, a greater amount of sediment will periodically be transported to the upper reaches of the bay, with resultant increases in the shoaling processes.

Channel erosion. A certain degree of channel erosion can be expected because of channel straightening. Although the efficiency of a straight channel is greater, the natural tendency of a youthful stream is to meander at low gradients. Obviously, in pipes and lined channels this characteristic is not significant. In natural and floodplain areas, however, bank erosion and channel abandonment are possible. In response to such processes, periodically increased sediment loads and some standing water conditions could occur. Periodic channel maintenance and general low flows should reduce these impacts to a near-normal sediment generation level.

Channel erosion related to flood discharge may be significant. The elevated carrying capacity and erosive potential associated with storm discharges can be expected to modify channel bottoms. Such sedimentation may contribute significantly to maintenance requirements and costs.

Loss of Resources

Construction of the levees and associated structures represents utilization of a finite local resource -- fill material and topsoil. Considering the potential supply of material within the valley and future requirements for such material, it seems unlikely that this use constitutes a significant impact. Concrete, sand, structural steel, and rock usage will represent an incremental increase in resource consumption. While analysis of the economics of this consumption is beyond the scope of this study, it is not felt that it represents a severe or unwarranted commitment.

Of the several million cubic yards of excess material yielded as a result of unbalanced cut and fill, much will be of sufficient quality to be of value as fill material and topsoil. As this material can either be consumed by other projects or can be stockpiled for future use, it does not represent a loss of resources in the classic sense. Sites used for disposal or stockpiling may be rendered unsuitable for future exploitation, however. Therefore, disposal sites must be selected with reference to future potential use.

Climate

Implementation of the proposed flood control improvements will have little or no direct impact on the micrometeorology of the area. Locations where concrete is used in channelization of streams will experience a slight increase in temperature and decrease in relative humidity due to the concrete's increased capacity to absorb heat. The area in question will be insignificant, however, as compared to the surrounding undisturbed area.

Indirect impacts of the project will be significant. If a sizable portion of the flood control area is later urbanized, significant increases in temperature and decreases in relative humidity will occur. The concrete and asphalt used in such developments will absorb heat more readily than will open ground, thereby holding more solar energy close to the ground. This causes the temperature at the ground to rise and leads to a consequent decrease in relative humidity. Many studies have been done on temperature increases over urban areas; however, it is difficult to quantify the temperature increase that could be involved in the East Zone, since the increase will depend on the amount of area paved, spatial distribution of paved areas and open areas, topography, and comprehensive historical data on the climatology of the northern Santa Clara valley.

Data for different sizes of cities are presented in Table IV-2 to provide a general indication of the temperatures that could be expected in and around a developed area. D_T is the difference between the maximum and minimum temperatures observed in this area, R/D_T is the least distance, in miles, for a 1°F change, and A is the extent of the urban temperature effect (more than 2°F greater than mean temperature).

Table IV-2

TYPICAL TEMPERATURES IN DEVELOPED AREAS

	San Francisco	San Jose	Palo Alto
Population	784,000	101,000	33,800
Incorporated Area (sq. mi.)	45.1	14.8	8.6
Population Density (persons/sq. mi.)	17,383	6,824	3,837
Average D_T (°F)	10° - 12°	7° - 9°	4° - 6°
R/D_T (mi./°F)	.30 - .40	.15 - .25	.05 - .15
A (sq. mi.)	4.0 - 6.0	1.5 - 2.0	0.1 - 0.3

Source: Duckworth, F. and J. S. Sandberg, "The Effect of Cities upon Horizontal and Vertical Temperature Gradients," Bull. Am. Meteorol. Soc. 35, No. 5, May 1954.

Precipitation over urbanized areas has also been shown to increase, due to the increased thermal convection and increased number of particles acting as condensation nuclei. Due to the nature of the proposed project, however (no heavy industry, coal burning, etc.), particulates should not be increased appreciably; also, because of the usual low humidity, thermal convection should not create convective cloud formation, as this occurrence is rare over the San Jose area with the present extensive state of urban development.

Air pollution dispersion potential is usually increased over developed areas due to increased vertical mixing caused by the increased thermal convection and greater turbulent mixing due to the greater surface roughness. Therefore, urbanization of the project area should not adversely affect air pollutant dispersion potential.

Water Quality

The water quality of the streams of the East Zone and the receiving waters of the South Bay will be adversely impacted by the proposed project. Part of this impact (i.e., direct impacts such as increased erosion and sedimentation rates) has been discussed earlier and will not be covered here. However, beyond the erosional potential of construction on and channelization of such a large area of floodplain lie the indirect, or secondary, water quality impacts arising from the potential increased urbanization of areas which previously were undeveloped.

Somewhat more than 10,000 acres of East Zone land now subject to flooding from the East Zone system of creeks would be open for development as a result of this project. These undeveloped lands are presently classified into four categories: (1) agricultural/orchard; (2) agricultural/other cultivated; (3) grazing, forest, and brush; and (4) vacant urban (undeveloped idle parcels). The great majority of the 10,000 acres falls in the first three categories.

In order to assess the water quality impact of the changeover of these predominately agricultural areas to residential and light industrial developments, we need first to determine the effects on water quality of the present land uses. Unfortunately, it is quite difficult to accurately measure the contribution of agricultural lands to the water quality of adjacent streams. The quality of agricultural wastewater in this region is affected by a number of factors about which little data is available -- type of crop, irrigation techniques, amount and types of fertilizers and pesticides used, and methods of irrigation drainage. Moreover, because of the diffuse nature of this wastewater source, it is practically impossible to monitor and quantify this type of wastewater discharge. All that can really be said is that the major agricultural wastewater constituents are pesticides, biostimulants, and dissolved solids.

The change from agricultural to urban use would tend to reduce these sources of pollutants, but this tendency is more than likely to be counteracted by pollution resulting from urban growth. Also, recent studies (EPA/URS Research Company) have pointed out that significant quantities of the above-mentioned pollutants are to be found on urban street surfaces. Moreover, the likelihood of these street surface contaminants reaching natural waterways is appreciably greater because of the increase in impervious surfaces which results from urbanization. In the agricultural setting we can assume that a portion of the pollutants will not reach the adjacent surface waters due to infiltration into the soil and subsequent leaching out and uptake by living organisms. With urbanization, this infiltration rate will drastically decline and more pollutants will be washed off during storm situations; however, some polluted wastes will still reach the groundwater. The net result is generally adverse in terms of use of the water or effect on the ecology of receiving waters. While by no means conclusive, some studies (for example, Yorke and Davis, 1972) have pointed to the possibility that sediment yields (i.e., solids) for urban basins may even be greater than for preurban (agricultural) conditions. (See previous discussion in this section on sedimentation and erosion.)

A number of factors contribute to this possible occurrence -- the land slope of the Santa Clara Valley, the increased volume of runoff and peak flows due to imperviousness, and the channelization of the stream beds. Indeed, studies (i.e., Thomas and Schneider, 1970) have indicated that the runoff increase due to development of impervious ground cover may be 70 percent to 250 percent greater than natural flow, depending on the extent of the drainage and sewerage.

As a result, the urbanization of previously agricultural lands will probably not significantly change the quantities of pesticides, biostimulants, and dissolved solids in the receiving surface waters. In some cases, this changeover may even increase the quantities. Unfortunately,

specific data describing quality factors for streams in areas undergoing urbanization are lacking, and there is no way to quantify these statements.

Once urbanization of these previously undeveloped lands is complete, three main factors will govern the water quality of the East Zone streams (i.e., the Coyote Creek watershed). These factors are the actual channelization of the streams, urban storm water runoff, and sewage discharges. The influence of channelization with its potential for increased sediment yields and higher temperatures in shallow, slow-flowing sections was covered earlier. As previously stated, storm water runoff, particularly from urban street surfaces, has a high polluting potential. The characteristics of this runoff depend on several factors including flow quantities, percentage of impervious areas, land uses, rain history, etc. Particularly important are the flow quantities involved. Unfortunately, while some data exist in regard to present flows (see the Water Quality discussion in Section III), no accurate predictions could be made for future flows after development except for the obvious fact that they would increase significantly. However, from past testing in the San Jose area, potential yearly loadings and possible concentration ranges based on present flows were determined. These loadings represent the potential increase of pollutants due to street surface runoff which would result from the complete development of the 10,000 acres of previously undevelopable land in the East Zone. The calculations were based on the assumption that approximately 10 percent of this land would be used as streets and highways, giving a total of 450 additional curb-miles of roadway in the East Zone. The resultant additional loadings are given in Table IV-3.

Upon comparison with the values of storm water loading which were determined for the present (i.e., 1970) state of development of the East Zone (see Section III), it can be seen that the additional potential urbanization will increase the loading from this source by approximately 30 percent. This sizable increase is particularly significant because of the nature of the pollutant source. Because of the dispersed nature of street

Table IV-3

POTENTIAL POLLUTANT LOADING IN EAST ZONE CREEKS DUE TO STORM WATER RUNOFF
(Resulting from Development of Previously Undevelopable Areas)

Parameter	Total Tons/Year	Possible Additional Concentrations in Creeks During Periods of Rainfall (mg/ℓ)	Permissible USPHS Surface Water Quality for Public Water Supplies (mg/ℓ)
BOD_5	260	8.7 - 87	--
COD	1,500	50 - 500	--
$PO_4^{=}$	19	0.63 - 6.3	Narrative
NO_3^{-}	0.5	0.017 - 0.17	10
N	40	1.3 - 13	--
Solids	24,000	800 - 8000	--
Cd	0.05	0.0017 - 0.017	0.01
Ni	1.0	0.033 - 0.33	--
Pb	10	0.33 - 3.3	0.05
Zn	14	0.47 - 4.7	5.0
Cu	3.1	0.10 - 1.0	1.0

Source: URS Research Company.

surface pollution, it cannot be treated before it is released into the local surface waters. Thus, the potential impact of this pollution is directly felt in the streams and cannot easily be mitigated. While it should be noted that part of this impact will be offset by a decrease in agricultural wastewater, the range of pollutants found in street surface runoff is larger and includes several pollutants which are rarely found in an agricultural setting (such as heavy metals). Particularly noteworthy are the loadings of COD and heavy metals when compared with typical municipal discharges. When the range of expected stream concentrations of pollutants resulting from road surface runoff is compared to the permissible USPHS standards, it is seen that peak concentrations of some heavy metals would not be acceptable. These metals include cadmium, lead, copper, and possibly zinc. It must be understood that these concentrations only occur for short periods of time, while the standards are applicable to long-term averages.

Another major impact on East Zone water quality due to the potential development of these previously floodable lands is the resulting increase in sewage discharges. The zoning and subsequent development of the 10,000 acres of developable land, in accordance with current General Plans of the county and of the cities affected, is anticipated to be as follows: residential, 54 percent; light industry, 45 percent; and commercial, >1 percent. At the point in time when this development will be complete, all the resulting sewage flows will be directed to the San Jose/Santa Clara Treatment Plant, which will have a capacity of 160 MGD (assuming the Milpitas and Alviso plants are shut down as presently expected). The first concern would be in regard to the ability of the San Jose/Santa Clara plant to handle the projected additional wastewater flow of about 15 MGD that would result from the development (based on a potential additional population of about 150,000). Table IV-4 shows the flow projections for the San Jose plant and the contributions of the East Zone and the flood control project. As can be readily seen, the flows resulting from the potential development will result in annual flows by the year 2000 that will slightly exceed plant capacity. When we also consider that the canning season would

Table IV-4

PROJECTED WASTEWATER FLOWS
FOR SAN JOSE/SANTA CLARA TREATMENT PLANT AND THE EAST ZONE
(MGD)

	1980		1990		2000	
Domestic and Industrial (Average Annual Flows)	Without Project	With Project	Without Project	With Project	Without Project	With Project
San Jose/Santa Clara Plant	100	115	125	140	152	167
East Zone	41	56	56	71	74	89
Percentage due to East Zone	41%	49%	45%	51%	49%	53%
Domestic, Industrial, and Canning (July - October)						
San Jose/Santa Clara Plant	113	128	135	150	160	175
East Zone	41	56	56	71	74	89
Percentage due to East Zone	36%	44%	42%	47%	46%	51%

Source: Based on population projections made by Planning Department, County of Santa Clara and URS Research Company, and on flow projections made by San Jose/Santa Clara Treatment Plant Staff.

result in a 15 MGD increase over the plant capacity, it appears there may be a need to further increase the San Jose plant capacity beginning in the period before the year 2000. The basis for these flow projections is shown on Table IV-5, which is a summary of the San Jose/Santa Clara plant's own projections for the years 1985 and 2000. It should be noted that the BOD and suspended solids projections on that table are influent values.

With regard to the water quality of the East Zone, the additional 15 MGD will add to the waste discharges which the San Jose plant will release to the South Bay. Thus, while the impact of storm water runoff is initially felt on East Zone surface waters and then the Bay, the impact of the increased municipal discharges will add only to pollution of the South Bay. Assuming that the present (1970) pollutant discharge concentrations for the San Jose plant are representative and that there will be no significant changes in influent quality, projections were made for the total 1980 and 1990 discharges and the contributions of the East Zone and the flood control project. These projections are shown in Table IV-6. It should be noted that the discharges due to the flood control project's growth inducement effects are not included in the projected totals but rather are potential additions to these totals. While not very large, this additional potential discharge would still increase the total San Jose discharge by approximately 14 percent in 1980 and 11 percent in 1990. When we consider the already poor quality of the South Bay water, this addition is probably significant. However, it should also be noted that these discharges may be moved to new outfalls through regulatory action (i.e., disposal above the Dumbarton Bridge or into the Pacific Ocean). While we are reasonably confident of the San Jose plant's effluent quality, due to the completion of its expansion program and its projected influent values, there is no sure way of predicting the future actions of regulatory agencies as to discharge locations.

Table IV-5

WASTEWATER FLOW PROJECTION SUMMARY
1970-2000

Domestic and Industrial	1970	1985	2000
Population/1,000	720	1,064	1,412
Flow, gal/cap/day	100	104	108
MGD	72.0	110.5	152.5
BOD, lbs/day	197,000	284,000	377,000
mg/ℓ	321	308	296
SS, lbs/day	216,000	319,000	424,000
Canning (July - October)			
MGD	15.0	11.3	7.5
BOD, lbs/day	140,000	105,000	70,000
SS, lbs/day	8,800	66,000	4,400
Domestic, Industrial, and Canning (July - October)			
MGD	87.0	125.5	167.5
BOD, lbs/day	332,000	399,000	447,000
SS, lbs/day	304,000	385,000	468,000

Source: San Jose/Santa Clara Treatment Plant.

Table IV-6

PROJECTED WASTE DISCHARGES FROM SAN JOSE/SANTA CLARA TREATMENT PLANT

Parameter	1970 Concentrations[a] (mg/ℓ)	Potential Discharge from Previously Undevelopable Areas (tons/yr)	1980[b]		1990	
			East Zone Discharge (tons/yr)	Total Discharge (tons/yr)	East Zone Discharge (tons/yr)	Total Discharge (tons/yr)
Sodium	170.0	3,600	10,000	26,000	14,000	32,000
Potassium	16.8	360	1,000	2,600	1,400	3,200
Calcium	64.0	1,400	3,900	10,000	5,400	12,000
Magnesium	15.3	320	920	2,400	1,300	2,900
Ammonia (as N)	35.6	750	2,200	5,600	3,000	6,800
Chloride	193.0	4,100	12,000	30,000	16,000	37,000
Sulphate	97.0	2,100	5,900	15,000	8,100	19,000
Bicarbonate (as $CaCO_3$)	343.0	7,300	21,000	53,000	29,000	65,000
Total Phosphate (as P)	9.3	200	560	1,500	780	1,800
Nitrate (as N)	0.12	2.5	7	19	10	23
Total Dissolved Solids (TDS)	782.0	17,000	47,000	120,000	65,000	150,000
Alkalinity (as $CaCO_3$)	353.0	7,500	21,000	55,000	30,000	67,000
Hardness (as $CaCO_3$)	222.0	4,700	13,000	35,000	19,000	42,000
Boron	0.7	15	42	110	59	130
BOD_5	--	910	2,600	6,700	3,600	8,400
COD	61.5	1,300	3,700	9,600	5,200	12,000

a. Source: Santa Clara County Flood Control and Water District.
b. Based on projected wastewater flows in Table IV-4.

A relatively unquantifiable, but still significant impact resulting from the construction activities involved in this project is the possibility of accidental spills. Whenever construction occurs in the immediate proximity of waterways, the danger of spills which would be rapidly incorporated into the watercourse is increased. Potential sources of polluting materials (in regard to water quality) range from actual construction materials (i.e., unmixed concrete) to the fuels used to power construction machinery. Unfortunately, because of the nature of this type of pollution there is no way to predict either its occurrence or exact makeup. Past experience on this type of construction indicates that impacts are minor compared to the impact of construction. However, the possibility of a major incident still exists.

Air Quality

Direct (Construction-Related) Impacts

Construction-related air quality impacts arising chiefly from earth-moving operations, can be severe for small areas close to the activity. Besides the actual exhaust emissions, consisting of CO, HC, SO_2, NO_x, and particulates, large amounts of particulate material are lost because of soil disruption by construction equipment and wind erosion over the exposed surfaces. Exhaust emissions can be quantified using currently acceptable EPA emission factors.* Because few data are available on fugitive dust emissions, a limited monitoring effort was conducted at a flood control project construction site in San Jose. The conditions at that site are considered fairly representative of conditions that may be found at project sites in the East Zone.

Figure IV-3 shows the results of the particulate monitoring at this site. It can be seen that the majority of particulates are coming from the disturbed area. The nuisance particulates (>100μ) range to several hundred per cubic foot on the site, with an approximate weight concentration ranging from 4,000 to 15,000 $\mu g/m^3$. The suspended particulates (approximately 0.3μ to 10 or 20μ) have on-site weight concentrations from 600 to 2,000 $\mu g/m^3$. Table IV-7 shows the approximate size distribution of particulates (from 0.3μ to about 100μ) found at the site during construction activity and without construction activity. Except for the smallest range, there were substantially more particulates of the larger sizes in the ambient air during construction activity than when there was no activity. Therefore, the largest increases in particulates due to construction are associated with the nuisance sizes. Particulates of these sizes rapidly fall out of the air and form deposits on settling surfaces.

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*Compilation of Emission Factors, EPA, 1973.

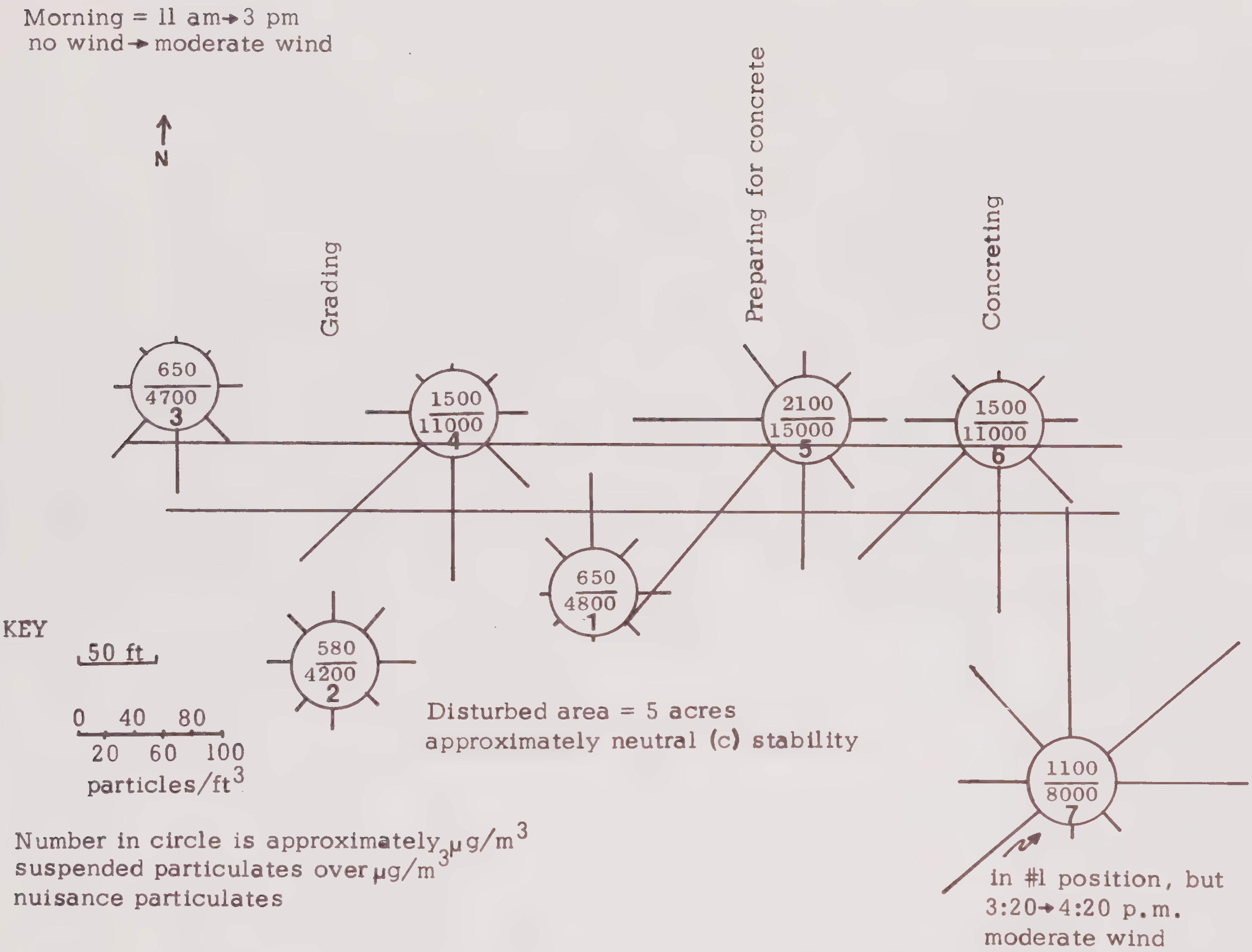

FIGURE IV-3 RESULTS OF PARTICULATE MONITORING AT FLOOD CONTROL PROJECT SITE

Table IV-7

SIZE DISTRIBUTION OF PARTICULATES ON CONSTRUCTION SITE
(Particulates per Cubic Foot)

Size Range (μ)	No Activity	Construction Activity	Percent Increase
0.3 - 0.5	1,200,000	560,000	-53%
0.5 - 1.0	160,000	220,000	38
1.0 - 3.0	19,000	89,000	370
3.0 - 5.0	110	390	250
5.0 - 10.0	28	400	1,300
10.0 - 100.0	0	47	∞

These concentrations were evaluated to determine the emissions of particulates and resulting downwind concentrations. Table IV-8 shows the results of these calculations. One cannot calculate downwind nuisance particulate concentrations, because some of these particles are deposited as they are blown away from the site. The deposition rate as described by Smith* that is shown in Table IV-8 is only applicable for particles <20μ in diameter, and would therefore be greater if all sizes were considered. The amount "falling back" to the ground on the construction site is most probably between 0.5 percent and 10 percent of the total nuisance particulates emitted. At one-quarter mile, the amount deposited may be about 30 $\mu g/m^2/sec$, and at one mile, about one-third this amount, or 10 $\mu g/m^2/sec$.

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*Maynard Smith, Prediction of the Suspension of Airborne Effluents, American Society of Chemical Engineers, 1968.

Table IV-8

APPROXIMATE CONCENTRATIONS AND EMISSIONS OF PARTICULATES ASSOCIATED WITH A CONSTRUCTION SITE (5 Acres Exposed Surfaces)

Particulates	On-Site Concentrations ($\mu g/m^3$)	Concentrations 1/4 Mile Downwind ($\mu g/m^3$)	Concentrations 1 Mile Downwind ($\mu g/m^3$)	Deposition Rate on Site ($grams/m^2/sec$)	Emissions ($grams/m^2/sec$)
Nuisance	8,500	--	--	$> 8.5 \times 10^{-4}$	0.2
Suspended	1,200	44	13	--	0.03

Gaseous pollutants, including NO_x, NO, NO_2, and CO, were also monitored on the construction site. Table IV-9 shows the results of this monitoring during periods of construction activity. The low values are close to ambient concentrations which would be evident if no construction activity was taking place. The high values are intermittent peaks and the average values were obtained by averaging all values over an eight-hour period. Downwind concentrations caused by this construction activity may be approximately equal to the values shown in Table IV-10.

Table IV-9

RESULTS OF GASEOUS POLLUTANT MONITORING AT CONSTRUCTION SITE (ppm)

	NO	NO_x	NO_2	CO
Low	0.003	0.022	~0.02	2.5
High	0.20	0.28	~0.08	29
Average	0.11	0.17	0.06	5.0
Highest Increase	0.20	0.26	~0.06	27
Average Increases	0.10	0.15	~0.04	2.5

Table IV-10

APPROXIMATE DOWNWIND INCREASES IN GASEOUS
AIR POLLUTANTS CAUSED BY CONSTRUCTION ACTIVITIES
(ppm)

	NO	NO_x	NO_2	CO
1/4 Mile Downwind (average increase)	0.004	0.006	0.002	0.2
1 Mile Downwind (average increase)	0.001	0.002	0.001	<0.1

Knowing these atmospheric impacts caused by this construction, as well as the influencing parameters, it is possible to attain a general idea of impacts for each of the proposed projects. Some of the influencing parameters include: wind speed (5 m/sec), atmospheric stability (c), and disturbed area (5 acres), heavy equipment (one paddlewheel scraper, one front-end loader, one compactor, one blade, one backhoe, cement and water trucks), and type of channel improvement (concrete-lined channel). Table IV-11 shows some of these parameters, along with anticipated impact potentials and time durations. For the larger projects (Coyote, Silver, and Fisher Creeks, etc.), it is expected that several crews will be working simultaneously on different reaches. This would have the effect of reducing the impact on the close-by receptors, but would increase any basin-wide problems. The impact potential for particulates may be different from the impact potential for gases because of differing types of channel improvements, and other engineering parameters. In both cases, the duration of the construction activity is taken into consideration.

Table IV-11

CREEK PROJECT CHARACTERISTICS AND AIR POLLUTION POTENTIAL

Creek	Type of Improvement[a]	Year of Improvement	Length of Improvement (thousands of feet)	Estimated Cost of Improvement ($ Million)	Approximate Calendar Days of Construction[b]	Acres Exposed During Construction[c]	Cuts (thousands of cubic yards)	Fills (thousands of cubic yards)	Air Impact Particulate Category[d]	Air Impact Gases Category[d]
Berryessa	EC, CC, P, NC	1976	30	3.3	730	91	340	170	D	E
Silver	CC,EC, P	1976→1977	33	10	1,530	91	380	Neg.	D	D
N. Babb	CC	1978	0.8	0.42	140	0.5	Neg.	Neg.	A	A
Thompson	MFP,EC, RC,NC	1977→1986	34	1.5	450	59	63	38	D	C
Ruby	P,EC	1978	8	0.65	160	20	29	Neg.	C	B
Quimby	P,EC	1979	10	0.8	180	22	38	Neg.	C	B
Calera	EC,CC, P	1979	10	0.83	180	5.5	26	8	B	B
Fowler	P,EC	1979	13	0.9	180	15	28	Neg.	C	A
S. Babb	CC,MFP	1979	8.5	0.84	180	12	Neg.	Neg.	C	A
Lower Penitencia	EC,P	1980	3.5	1.1	400	8	80	10	C	D
Flint	P,EC	1981	10	0.84	180	11	15	Neg.	C	A
Upper Penitencia	MFP,EC, CC,RC	1982	20	3.1	410	113	265	158	D	D
Los Coches	EC,RC, CC	1980	9	9	350	8	15	Neg.	C	C
Evergreen	RC,NC	1986	12	0.3	130	6	26	8	B	B
Fisher	EC	1986→1987	36	2.8	380	175	1,360	9	D	D
Yerba Buena	P,NC	1986	8	0.1	100	12	0.6	0.2	B	A
Coyote	MFP,NC, EC	1977→1985	179	22	2,600	3,000	∿2,700	∿2,200	E	E
TOTALS		1976→1987	424	58	8,280	3,650	5,370	2,600		

a. MFP modified floodplain
   NC minimal change
   EC earth channel
   CE concrete channel
   RC rock channel
   P pipe

b. Total calendar days for creek project; includes several crews working simultaneously on separate reaches.

c. Includes all area within ROW for all channel improvements, except for minimal change (NC) reaches.

d. See Tables IV-12 and IV-13 for approximate values to be expected on site and downwind from creek projects.

A, least air pollution potential.

E, greatest air pollution potential.

Tables IV-12 and IV-13 show the approximate ranges of on-site (adjacent to site) and downwind concentrations that may be expected for each category. Table IV-14 shows the possible percentage of time when ambient air standards might be exceeded if the construction were taking place now. These ranges of values include varying meteorological conditions (stability and wind speeds), ranges of exposed acres, and varying amounts of heavy equipment at each project site.

Table IV-12

RANGE OF PARTICULATE VALUES
WHICH MAY OCCUR
FOR VARIOUS TYPES OF PROJECTS
($\mu g/m^3$)

Pollutant Potential for Particulate[a]	On Site		1/4 Mile Downwind	1 Mile Downwind
	Nuisance	Suspended	Suspended	Suspended
A	300 - 2,000	40 - 300	1 - 10	<1 - 3
B and C	1,000 - 10,000	160 - 7,000	3 - 300	<1 - 30
D	2,000 - 10,000	200 - 10,000	20 - 1,000	1 - 300
E	>10,000	>10,000	140 - 2,000	20 - 700

a. See Table IV-11.

Table IV-13

POSSIBLE RANGE OF GASEOUS CONCENTRATIONS
WHICH MAY OCCUR
FOR VARIOUS TYPES OF PROJECTS
(ppm)

Pollutant Potential for Gases[a]	On-Site		1/4 Mile Downwind		1 Mile Downwind	
	CO	NO_2	CO	NO_2	CO	NO_2
A	0.7 - 13	0.008 - 0.15	<0.1 - 0.5	0.001 - 0.05	<0.3	<0.001 - 0.003
B	1.5 - 20	.020 - .30	< .1 - .9	.003 - .09	< .5	< .001 - .004
C	2 - 30	.020 - .40	< .1 - 1	.003 - .12	<1	< .001 - .006
D	2 - 60	.020 - .70	< .1 - 2	.004 - .22	<1	< .001 - .011
E	7 - 90	.080 - 1.0	.1 - 3	.014 - .34	<2	< .001 - .017

a. See Table IV-11.

Table IV-14

PROBABILITY OF CERTAIN LIMITING STANDARDS
BEING EXCEEDED DURING PERIODS OF CONSTRUCTION

	On-Site			1/4 Mile Downwind			1 Mile Downwind		
Pollutant Potential[a]	Federal 24-Hour Particulate	Federal 8-Hour CO	State 1-Hour NO_2	Partic-ulate	CO	NO_2	Partic-ulate	CO	NO_2
A	R-A	R-A	N-A	R	R	N	R	R	N
B	A	R-A	N-A	R-A	R	N-R	R-S	R	N
C	A	R-A	N-A	R-A	R	N-R	R-S	R	N
D	A	R-A	N-A	R-A	R	N-M	R-A	R	N
E	A	M-A	R-A	A	R-S	N-A	R-A	R	N

a. See Table IV-11

Note: N = Never (<0%) S = Seldom (10-50%) A = Always (100%)
R = Rarely (0-10%) M = Most of the time (50-100%)

The occurrence probabilities for various standards to be exceeded vary widely. Clearly, the largest problem is particulates near the construction sites. The current standard for particulates is exceeded about 3 percent of the time in the San Jose area, while the CO standard is exceeded about 1 percent of the time. There are no values that may cause health hazards generated by this construction activity. The large amounts of particulates would cause nuisance conditions as far as one mile downwind for large projects. The future changes in ambient air quality would not be sufficient to change the approximate occurrences greatly.

Indirect Impacts

As a result of the proposed project, many areas that are now floodable will be opened up for development. The resultant increase in population will have an adverse impact on the air quality of the area. Predicting specific air pollutant levels is an extremely complex task, involving the meteorology and topography of the area, future emissions, government regulations, and complex photochemical reactions. Predicting absolute concentrations is beyond the scope of this project, as this would require much more detailed meteorological baseline data (especially for the southern Santa Clara Valley) than are available. However, relative increases in pollutant concentrations can be estimated by using a simplified relationship. It has been shown that, over large areas within the air basin, air pollutant emissions are directly related to ambient air quality. These increases were estimated to give an indication of how ambient air quality will change.

In this analysis, one wind direction, approximately north to south down the valley, was considered. This wind direction occurs more often than any other in the valley, according to the "Smalley Report" (BAAPCD Information Bulletin 6-15-70, 1970), which shows frequencies of wind direction in the Bay Area. Table IV-15 summarizes the percent frequency of three major wind occurrences. The data show that 59 percent of the time the Santa Clara Valley receives pollutants blown from the north, and 19 percent of the time

the rest of the Bay Area receives pollutants blown from the Santa Clara Valley. Therefore, this analysis will not show the total increase in pollutants expected in the Santa Clara Valley, since a substantial amount is received from the north. Also, the expected population increases will have an effect on the Peninsula and the northern part of the Bay Area 19 percent of the time.

Table IV-15

PERCENT FREQUENCY OF THREE MAJOR WIND DIRECTIONS

Wind Direction	Percent Occurrence	Upwind Affected Areas	Downwind Affected Areas
NW	32%	North Bay	Santa Clara Valley
SE	19	Santa Clara Valley	North Bay
W-SW	27	Midpeninsula	Santa Clara Valley

Several stabilities, mixing heights, and wind speeds were considered and were found to cause little difference in the distribution of relative increases of concentrations, although the magnitude of the increase is greater with increased stability.

Six major pollutants are normally of concern -- hydrocarbons, carbon monoxide, oxides of nitrogen, sulfur dioxide, particulates, and oxidants. Most of the carbon monoxide, oxides of nitrogen, and hydrocarbon emissions in the Santa Clara Valley are from automobile exhaust. Figure IV-4 shows the breakdown of air pollutant emissions by major sources in the nine-county Bay Area Air Pollution Control District. All the pollutants mentioned above except oxidants are normally referred to as primary pollutants.

Photochemical oxidants are a product of the photochemical reaction between reactive hydrocarbons and nitrogen dioxide, a reaction which can require about two hours. Oxidants are considered a valley-wide problem because of the amount of mixing required from all sources in the area.

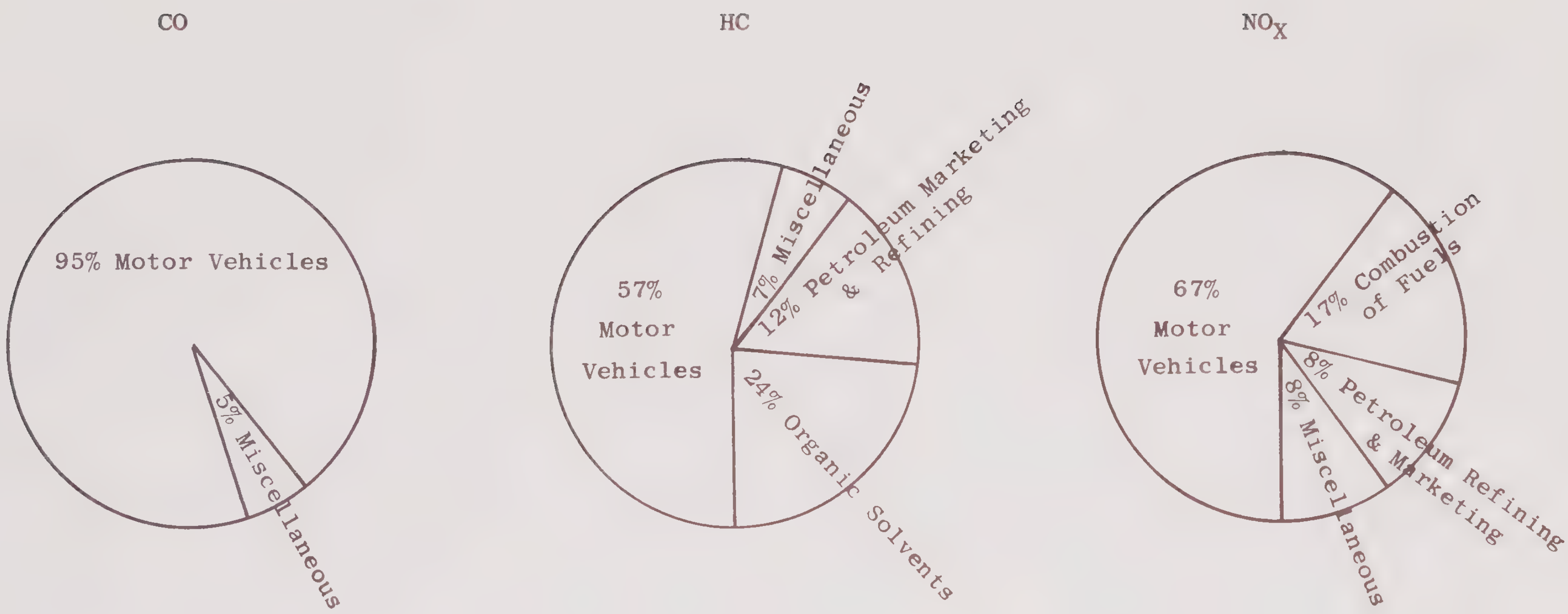


FIGURE IV-4 PERCENT DISTRIBUTION OF SOURCES OF CARBON MONOXIDE, HYDROCARBONS, AND OXIDES OF NITROGEN

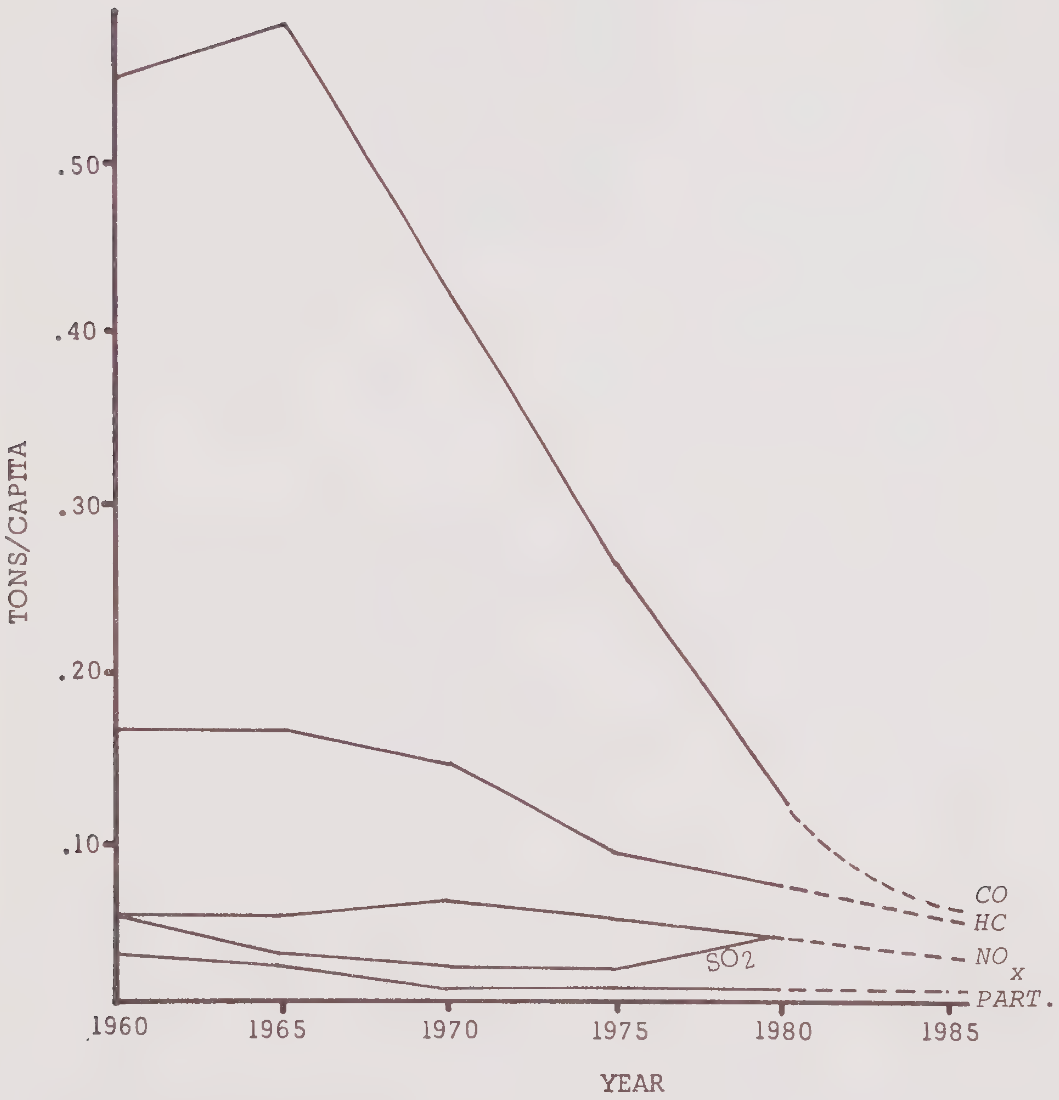
Oxidant concentrations are monitored continuously and are used as an indicator of the severity of photochemical smog; therefore, they will be used here to assess the impact of population increases on valley air quality.

As mentioned previously, estimates of future total emissions are used to predict future air quality. To estimate this parameter, present and future emission-per-person figures were estimated using Bay Area Air Pollution Control District data for present emissions in the Bay Area and predictions for future emissions. These values for each pollutant were combined with present population and future population projections for the Bay Area to obtain the emissions-per-person figure. Figure IV-5 shows the trends of these values over time.

These values were then combined with population estimates for floodable areas now and in the future (URS estimate) to get a total emission figure for the present and future. This estimate takes into account population increases in presently floodable areas only; therefore, the listed increases in concentrations reflect only this population increase. Actual increases will be greater due to increased population in areas not affected by the flood control project.

A computerized dispersion model was used to predict pollutant concentrations in the valley from the predicted total emission mentioned above. The model is a modified finite line source dispersion model, developed by Turner,* which is commonly used to estimate area sources. The valley was divided into 6-mile by 3-mile grids and the increased emission from each grid due to floodable area population increases was estimated. As mentioned before, several different stabilities, mixing heights, and wind speeds were considered -- specifically annual morning averages and annual afternoon averages. These values were obtained from Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the Contiguous United States (U.S. Environmental Protection Agency, January 1972). The

*Workbook of Atmospheric Dispersion Estimates, Turner, 1969.



Source: Derived from Source Inventory of Bay Area Emissions, 1971.
Dotted line indicates extrapolation by URS Research Company

FIGURE IV-5 ESTIMATED TOTAL BAY AREA EMISSIONS
(Tons per capita per year)

model then used the estimated emission in each grid with a population increase to calculate concentrations downwind.

The oxidant concentration increases expected are for the typical wind direction mentioned previously and are based on hydrocarbon emission increases, the usual limiting condition. The largest oxidant increases (approximately 0.03 ppm) should be found downwind of the largest population increase areas, in the Coyote and Morgan Hill planning areas. Smaller increases (approximately 0.01 ppm) should be found farther downwind in the valley in the San Martin and Gilroy planning areas. Due to convergence of the valley and consequent pollutant accumulation, increased oxidant levels should be distributed fairly evenly throughout the valley and even into the foothills. The Edenvale and Evergreen planning areas, where maximum population increases will occur, will not experience significant oxidant increases because of oxidants downwind from sources. The relative increases are shown in Figure IV-6.

It must be stressed that the estimated increases are for maximum population increases and "worst case" meteorological conditions. The future increases were estimated assuming that the maximum predicted population growth will occur. The flood control project is predicted to be completed in 1988; therefore, the time when the maximum population is reached after the year 1988 does not make any difference in this analysis, as emissions per person are assumed to remain at a constant level after 1986. The predictions that are quantified are thus for the year that the maximum predicted population is reached.

"Worst case" meteorological conditions refer to stable conditions and a 3-meter/second (6.7 mph) wind speed. This condition is most likely to occur in the morning hours. The other stability considered was a neutral stability in conjunction with a 5-meter/second (11 mph) wind speed, which occurs mostly in the afternoon. Although the percentage increase in oxidant values over present values is the same in both stability cases, the

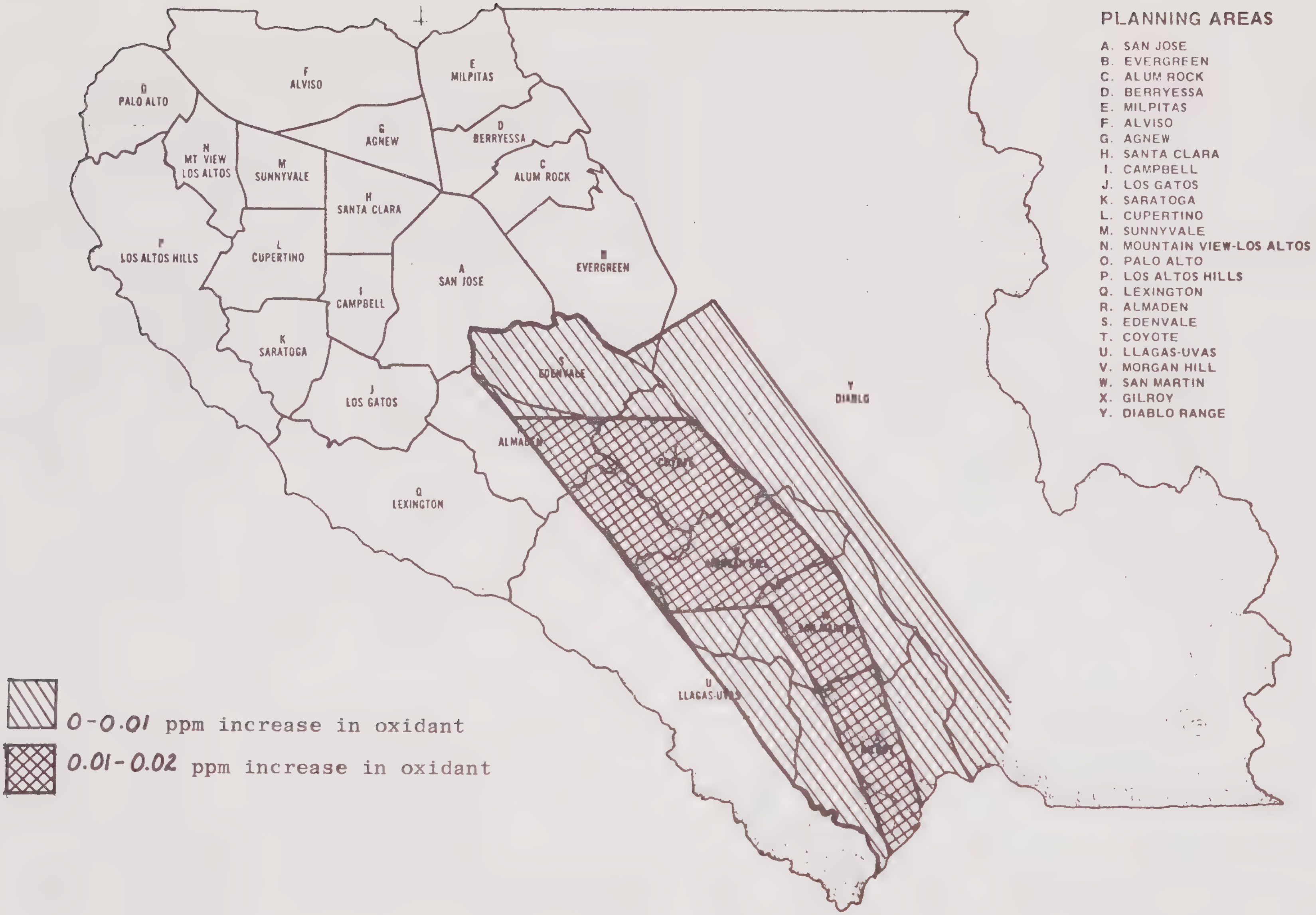


FIGURE IV-6 OXIDANT INCREASES DUE TO FLOODABLE AREA POPULATION INCREASE
(During typical northwest wind condition)

magnitude of the increase for neutral stability is approximately one-tenth less than the increase during stable conditions.

The assumptions involved in this analysis make the quantified increases only general indications of what will happen. Oxidant values were calculated by assuming hydrocarbons are the limiting factor in their formation and that 50 percent of total hydrocarbons are reactive. It was also assumed that this percentage will remain the same in the future.

Judging by the predicted increases in oxidant levels, it is safe to say that oxidant standards will be exceeded more frequently than they are now in the Coyote, Morgan Hill, San Martin, and Gilroy planning areas of the Santa Clara Valley, due to the population increases farther north. To quantify the frequency with which these standards will be exceeded would take much more detailed information on oxidant increases and stability occurrences than can be predicted at this time.

So far, only the impact on oxidant levels has been discussed. Also of significant concern is the impact that primary pollutants will have on local air quality. Carbon monoxide is the pollutant usually used to quantify local air quality impacts, due to its low reactivity with the atmosphere. High carbon monoxide levels are generally experienced downwind from heavily traveled roadways, with highest values found at congested intersections. An inverse relationship exists between the speed at which an engine is running and the amount of CO it is emitting. This relationship will not exist on cars after the 1976 model year, due to anticipated efficiencies of CO removal equipment. A sixfold decrease in carbon monoxide emission per person is predicted to take place by 1988, because of future emission controls. Therefore, in most areas CO levels will decrease despite population increases. Unfortunately no further traffic estimates are available specifically for the expected population increase; therefore no specific carbon monoxide values can be estimated for local areas. Based upon the decrease in emissions and increase in population, however, an estimate has

been made of the magnitude of concentration changes; these are shown in the following tabulation. The greatest population increase is predicted to occur in the Edenvale planning area; therefore this area will probably experience only a 20-percent decrease. These percentages are only general indications of how carbon monoxide levels will change.

CHANGES IN POLLUTANT CONCENTRATIONS
DUE TO POPULATION CHANGES
IN FLOODABLE AREAS

Planning Area Now Subject To Flooding	Change in Oxidants X Present Value	Change in Carbon Monoxide X Present Value	Change in Hydrocarbons X Present Value	Change in Oxides of Nitrogen X Present Value
A. San Jose	1.5X[a]	3 X[a]	8 X[a]	8 X[a]
B. Evergreen	1 X	0.5X	1.3X[b]	1.3X[b]
C. Alum Rock	1 X	0.2X	0.6X	0.6X
D. Berryessa	1 X	0.2X	0.5X	0.5X
E. Milpitas	1 X	0.4X	1.2X[b]	1.2X[b]
F. Alviso	1 X	0.1X	0.5X	0.5X
G. Agnew	1 X	0.2X	0.5X	0.5X
S. Edenvale	2 X[a]	0.8X	2.6X[b]	2.6X[b]
T. Coyote	2 X[b]	0.2X	0.5X	0.5X

a. These concentration increases are expected to cause insignificant absolute concentrations, since the present ambient values resulting from the current floodable areas population are insignificant.

b. Possibility of occasionally exceeding ambient air standards in the future.

A factor to consider is that there will be an increased number of cars on the existing and new roads, creating additional congestion. Since the greatest problem with CO concentrations is found at congested intersections or roadways, from an air pollution standpoint this situation should be avoided if possible. If substantially more congestion occurs in the future

than at present, carbon monoxide levels in these local areas could be as high or higher than at present. Based upon the above discussion, it is unlikely that carbon monoxide standards will be exceeded more frequently than they are now.

Other primary auto pollutants, oxides of nitrogen and hydrocarbons, are difficult to quantify in a local area with little traffic data; therefore the future concentrations are not estimated except in the most general terms. Both oxides of nitrogen and hydrocarbon emissions per person are expected to decrease approximately 50 percent by 1988. Using the same rationale as for carbon monoxide, that is, considering the emission reduction and population increase, over a 100-percent increase could occur in the Edenvale area (with the greatest population growth), while a 50-percent decrease could be realized in the areas with the smallest population growth. As mentioned earlier, these figures are only general indications and could vary according to average route speed on roadways. The concentration changes expected for each specific area affected by the proposed project are shown in the tabulation above.

Hydrocarbon emissions, like carbon monoxide, vary inversely with engine speed, while oxides of nitrogen emissions vary directly with engine speed. These two pollutants are not directly relatable to air quality standards. Oxides of nitrogen are emitted from automobiles primarily in the form of nitric oxide, which is highly reactive and forms nitrogen dioxide only. Hydrocarbon standards are written for reactive hydrocarbons only from 6 to 9 a.m., to prevent high oxidant accumulation. These predictions and available air quality monitoring data are based on total hydrocarbons only. It is anticipated that the rate of reactions and NO_2/NO_x and RHC/THC mixes will remain the same, and that ambient air standards may be exceeded more frequently in some areas and less frequently than now in other areas.

The emission-per-person projections for the future take into account an average industrial growth rate. There is planned to be some light and heavy industrial development in the East Zone. This could produce significant point emission sources, especially from heavy industry, although they cannot be quantified without knowing what type of industry will be established. Since the locations of the industrial areas are tentatively known, to avoid future problems residential development should not take place adjacent to these sites.

Again, it must be emphasized that the changes in pollutant concentration described here are for the increased population in presently floodable areas only. The increase in population is estimated by the Santa Clara County Planning Department to be approximately twice as great as the increase in the presently floodable areas affected by the proposed project. Therefore, pollutant levels may increase approximately twice as much, considering total population growth rather than floodable area population growth in those areas indicated.

Noise

The construction of the proposed facilities will have direct impacts on the noise environment, but no impacts will occur during operation of the facilities. Indirect impacts will occur as a result of development of land areas heretofore susceptible to flooding, primarily because of the increase in the level and intensity of human activities in areas now of a rural nature or of very low residential density. The following discussion examines the magnitude and significance of these impacts.

Construction noise is not generally considered the source of a significant adverse impact due to its short-term nature. However, in this case construction is likely to last for several months and hence, through the potential for annoyance, may have adverse impacts. Reaction to construction noise is strongly influenced by attitudes toward the perceived need and desirability of the project being constructed. For example, construction noise may frequently interrupt conversations in the home or a place of business. If the project under construction is viewed favorably, little outward sign of annoyance may be expressed. If it is viewed unfavorably, complaints and legal action may result. It must also be recognized that construction noise, by its nature, has a high potential for annoyance. Construction noise is highly variable in intensity; compared to the steady hum of a highway or an air conditioner, it is much more difficult to adapt to. The variability of noise level and the unpredictable (to those listening to it) nature of intruding high noise levels can be most annoying if the activity generating the noise lasts for significant periods of time.

The noise standards developed in Appendix C were based on extensive literature on the subject of noise effects, and current federal guidelines. In summary, the standards used are: 60 dBA average daytime - 50 dBA average nighttime for residential land use; 65 dBA average daytime - 55 dBA average nighttime for commercial land use; and 70 dBA average daytime - 60 dBA average nighttime for industrial land use.

Current noise levels in most residential areas are 10 to 15 dBA below the standard adopted in Appendix C for residential land use. This, then, should be the absolute limit for average noise levels from construction activities. This limit is insufficient, however, for a complete assessment of impacts, as there should also be an absolute limit on the dBA increase above ambient noise levels. For this study this incremental increase has been set at 10 dBA. In other words, construction activities will generate an adverse impact if: (1) the ambient noise level is increased more than 10 dBA; and/or (2) the standards for different land uses are exceeded, whichever occurs first.

Noise levels during construction, at a reference distance of 50 feet from the site, generally average about 85 dBA. The standard deviation in this noise level, a measure of its variability, ranges from about 6 dBA for an ambient noise level of 70 dBA to about 9 dBA for an ambient noise level of 40 dBA. Peak noise levels can be quite high, with about 100 dBA being exceeded 10 percent of the time. These noise levels will be reduced in many cases because of the geometry of the channel cross-section being constructed, which will provide some shielding. Structures along the right-of-way, such as a row of homes, will also provide shielding to other structures at greater distances.

The foregoing information, in conjunction with the general plans and maps for each creek project, was used to determine areas of significant adverse impact. The results of this analysis indicate that approximately 970 residences, 20 industrial or commercial enterprises, 14 recreation areas, and 2 schools will be significantly affected. The results given in Table IV-16 are subject to revision pending the determination of final plans and construction schedules. The results indicate that nearly 95 percent of the affected residences, all of the commercial or industrial concerns, all but one of the recreational areas, and both schools will be affected by construction along 8 of the 18 creeks. These creeks are Coyote, Silver,

Table IV-16

CONSTRUCTION NOISE IMPACTS

Creek Project	Number of Units Affected			
	Residences	Commercial or Industrial	Recreation Areas	Schools
Coyote	98	5	10	0
Fisher	5	0	0	0
Silver	387	12	3	0
Thompson	45	0	0	0
Yerba Buena	1	0	0	0
Evergreen	1	0	0	0
Fowler	0	0	0	0
Quimby	3	0	0	0
Ruby	42	0	0	0
Flint	28	0	1	0
S. Babb	156	1	0	1 (Mt. Pleasant)
N. Babb	13	0	0	0
Upper Penitencia	47	0	0	1 (Toyon)
Berryessa	6	0	0	0
Los Coches	58	2	0	0
Calera	0	0	0	0
Lower Penitencia and East Channel	80	0	0	0
Totals	970	20	14	2

Thompson, Upper and Lower Penitencia, South Babb, Los Coches, and Ruby. In terms of the proposed construction schedule, approximately 95 percent of all impacts will occur within the four-year period 1977 through 1980.

Indirect noise impacts will occur in the form of a general increase in the noise levels which currently characterize the present noise environment. However, no significant adverse impact is anticipated, as the increased levels should still be within the standards adopted. This is not to say there will not be localized areas where standards will be exceeded, but these should be primarily confined to commercial or industrial areas or to areas where mixed commercial and residential land use occurs.

B. Ecological Impacts

Flora

Throughout the approximately 83 miles of creek channel included in the flood control improvement project, the vegetation will receive impacts ranging from slight disturbance to complete removal. An estimated 20 percent of the stream channels will be left unmodified; here vegetation will receive only indirect impacts. Some disturbance will result downstream from modifications upstream. Related projects, such as road construction, may introduce undesirable species or modify the adjacent environment, thus indirectly modifying the creek vegetation. Increased runoff will have some effect on the vegetation of unmodified channels.

Approximately 25 percent of the project involves construction of levees to produce modified floodplains in which the impact will be moderate. The remaining 55 percent of the project involves channels subject to more intensive modifications (concrete channel, earth channel, rock- or gabion-lined channel, pipe or concrete box, or modified floodplain with excavated channel) and more disruptive impacts. Approximately half of the area subject to modifications other than the modified floodplain is in residential, commercial, or industrial uses that are presently highly developed and in which the natural plant communities are already extensively modified and simplified. The remaining reaches now support plant communities that have been modified previously directly and indirectly, as a result of adjacent agricultural and urban development. However, many elements of the natural wet or dry riparian or estuarine plant communities remain.

Generally, the most significant impacts on flora will be the simplification of ecosystems and the consequences, either direct, or indirect,

of those simplifications. Impacts on the plant community are intimately linked with impacts on the animal communities and on the entire ecosystem. Simplification or removal of the plant community obviously results in a modification of the animal communities that depend, in some way, on the plant community.

When a plant community is simplified from one with many species and many individuals to one with few species and few individuals, the result is a much harsher environment for those plants that do remain. The organisms in a simplified ecosystem are more subject to the full impact of environmental forces than are those in more complex ecosystems. For example, in a wet riparian woodland community, the trees, shrubs, and herbaceous plants have evolved homeostatic controls and interdependent relationships that would lessen natural and minor artificial impacts. Removal of shrubby and herbaceous ground cover results in increased insolation of the soil and decreased protection from cold. The result is increased fluctuation in soil temperature and moisture. Water is lost more quickly, both by evaporation to the atmosphere and by drainage to the water table. As water drains to the water table, essential nutrients are leached from the soil, lowering fertility. Eventually there is a loss of vigor in remaining plants and increased susceptibility to further environmental fluctuations and to pests and disease. Some plants are adapted to the conditions of the simplified ecosystem. These colonizers are usually less desirable species than those of the natural community and may compete with the remaining native vegetation or prevent recolonization by native species (Odum, 1971). Colonizers such as star (Barnaby's) thistle and bindweed are less attractive than native species; more important, they spread to adjacent residential, cultivated, and grazing lands.

Another significant impact of the project will be an increase in the rate of water flow and runoff. As a result, bottom riparian and lower bank vegetation will have more difficulty becoming established. Adjacent soil will be drier, which may result in the loss of some of the more hydrophylic

terrestrial riparian species, even in areas where direct modifications do not take place.

A third major impact will be loss of vegetation in existing channels to be diverted. If the old channels become dry, they will not be able to support riparian vegetation, especially the more hydrophylic species.

The most obvious significance of natural plant communities is in their relationship with animal communities. The reduction of riparian vegetation results in a corresponding reduction and redistribution of riparian fauna. Riparian plant communities are significant for another reason. They have always been relatively rare in relation to the total habitat in the Santa Clara Valley. Any reduction of the remaining riparian vegetation represents a reduction of an already rare plant community type.

Although few, if any, rare or endangered plants will be threatened by the project, each plant community represents a unique assemblage of plants. Whenever a natural or partially natural plant community is removed or disturbed, a unique biological entity is lost and replaced by a simpler community, usually of introduced plants with little aesthetic value. It can be assumed that, whenever a natural or partially natural community is disturbed, this in itself is an adverse impact, whether or not animal communities or rare, unusual, or extremely old plants are to be eliminated.

Short-Term Impacts

Removal of vegetation during the construction phase will be the greatest of the short-term impacts of the project. Lesser impacts, such as dust generated by construction falling on plants that are to remain and somewhat reducing their efficiency in photosynthesis, transpiration, etc., will also occur during the initial phases of the project.

Impacts on Habitats

The bottom riparian community will be most extensively affected by the flood control improvements. Bottom riparian vegetation will be removed wherever modifications other than the modified floodplain are to be made. The bottom riparian community is the only natural riparian plant community existing extensively in intensively developed urban areas. Bottom riparian vegetation, such as cattails, bulrushes, sedges, and tall grasses, is extremely important as habitat for animals. Bottom vegetation and hydrophylic plants growing on the lower slopes of creek beds are important in erosion and runoff control.

Wet and dry riparian plant communities will also be disturbed significantly. Although most of the larger trees are to remain, extensive shrubby and herbaceous vegetative cover will be removed. The result will be a much simplified ecosystem.

The baylands vegetation will undergo some disruption in the construction of the modified floodplain. Except for the areas directly affected by the construction of levees, there will probably be little short-term modifications in the baylands plant community.

Extensive waste field, grassland, and agricultural vegetation is to be removed. The waste field supports a community in a very early successional stage, and is itself the result of an earlier impact on a more mature community. The plants to be removed are mostly considered to be weeds that interfere with native and cultivated plant communities. The only adverse effect of removing this type of vegetation is a temporary loss of soil stability and possible increased erosion. Loss of grassland is more significant because it serves as grazing land and because it has a greater effect on runoff and erosion control than does the waste field. Many fruit trees and some vineyards are to be removed, resulting in loss of fruit production.

Only small amounts of developed urban vegetation will be disturbed. Most of the urban improvements will involve areas just adjacent to the creeks that are usually not landscaped, but there are exceptions.

Impacts by Type of Modification

Natural channels will involve little immediate modification of the plant community. Construction of culverts and bridges will disturb plant communities in small areas. When access roads are built adjacent vegetation (i.e., waste fields, grassland, or agricultural) will be removed. Dust from construction will have some detrimental effect on the creek vegetation -- dust coats the leaves and lowers light penetration and photosynthesis. Transpiration is also reduced as a result of clogged stomata.

The modified floodplain will remove vegetation where levees and access roads are built but the riparian vegetation will be undisturbed. The levees will mostly run through waste fields and agricultural areas, not disturbing natural plant communities although several thousand fruit trees and vines will be removed. The levees through the baylands, however, will have a greater impact. Levees on each side of Coyote Creek will extend from the bay through salt marshes for approximately 2 miles, with widths ranging from about 50 to 230 feet. Assuming an average width of 100 feet, levee construction will remove approximately 4.8 acres of salt marsh and mudflat habitat. Pickleweed and cord grass will be the major species affected. While this represents only a small percentage of the total salt marsh vegetation of the South Bay, a significant amount of productivity will be lost. Net primary productivity for cord grass is 8 tons/acre and for pickleweed it is 5 tons/acre/year.* Assuming that 25 percent of the

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*Robinette, G.O., "Plants, People, and Environmental Quality," U.S. Dept. of the Interior, U.S. Government Printing Office, 1972.

area is mudflat with very little productivity and that cord grass is more abundant than pickleweed, the annual loss of productivity would initially be approximately 30 tons/year (a range of 24-39 tons/year).

The levees will eventually become revegetated with some pickleweed, saltgrass, alkali heath, and other species which will help compensate for the loss of productivity, but this levee community will certainly be less productive than the salt marsh community. This loss of salt marsh vegetation represents a further reduction of an already diminishing plant community and habitat for animals that can live in no other type of habitat.

Addition of a low flow channel adjacent to the natural floodplain will initially remove salt marsh vegetation through the same length as the levees and over widths ranging from 100 to 130 feet. Recovery will take place unless it is prevented by maintenance to keep the channel clear.

The excavated channel adjacent to the natural channel on Coyote Creek from near the San Jose-Alviso boundary to Trimble Road will pass through waste fields and pear orchards and will have little impact on natural plant communities, although some 2,000 pear trees are to removed. The length of the auxiliary channel is 9,000 feet, and the average width is approximately 400 feet. Approximately half of the future channel will be excavated through existing pear orchards. Some destruction of natural vegetation will occur at the junction of the auxiliary channel with Coyote Creek at Trimble Road. The creek bank is richly vegetated with many herbaceous and shrubby plants and a few trees at this location.

The auxiliary channel on Upper Penitencia Creek is also to be through waste fields and orchards, but will be narrower than that on Coyote Creek.

Earth, rock, and gabion channels involve removal of vegetation within the excavated area and maintenance roads, but provision can be made to excavate around trees that are to be saved. These types of modifications

have a very strong impact on the plant community. Even where trees are saved, the removal of shrubs and herbs results in a very much simplified ecosystem. The remaining trees are subject to much more severe conditions than in the original plant community.

The concrete channel is the most disruptive to the plant community and requires removal of all vegetation within the excavated channel. This type of modification is to take place mostly in already developed urban areas where most plants are introduced, cultivated, or weedy species.

Impacts on Specific Creeks

Coyote Creek. Between Trimble Road and Nimitz Freeway, extensive bottom riparian vegetation will be removed in excavation of the earth channel. A few sycamore and walnut trees near the freeway may be removed, but this can possibly be avoided (see section on mitigating measures).

Beyond the golf course to Bayshore Freeway, many shrubs and herbaceous plants will be removed when the earth channel is excavated, as well as any trees that cannot be saved. A significant amount of bottom riparian vegetation will also be removed. The area is industrial, but the riparian community is well developed in most parts.

Fisher Creek. The major impact on Fisher Creek flora will be the removal of copious amounts of bottom riparian vegetation throughout the reaches where it now exists (see Section IIIC).

Lower Silver Creek. Loss of bottom riparian vegetation will also be the major impact on the flora of Silver Creek. Six walnut trees between Story Road and Murtha Drive may be removed. Several apricot, cottonwood, and walnut trees, in reaches 28 and 29, may be removed as well.

Thompson Creek. Reach 3 of Thompson Creek will lose its herbaceous dry riparian plant community as a result of the earth channel to be constructed there. From Aborn Road to just downstream of Cadwallader Avenue the dry riparian woodland plant community will be greatly simplified if the proposed gabion-lined channel is constructed. Although the larger trees are to remain, they will be left without the small trees, shrubs, and herbs with which they are interdependent.

Fowler Creek. Several oak trees and a few walnut trees may be removed from the two proposed debris basins on Fowler Creek. The oak in the proposed northern dam site will almost certainly be removed. In addition, whether or not the trees are removed, a substantial amount of dry riparian vegetation is to be removed from approximately 2 acres in the northern basin and approximately 0.2 acre in the southern basin in addition to approximately 1 acre of orchard. The result will be either no dry riparian community or a much simplified one.

Flint Creek. The pipe proposed to be placed under Flint Creek from Flint Avenue upstream will reduce the amount of water available to the existing dry riparian vegetation and may cause the dry riparian community to disappear, or to be modified considerably, although the walnut and live oak trees can probably survive if they are not directly removed or damaged during construction. The alternative alignment would have approximately the same effect except that it would not directly remove or damage the riparian vegetation during construction. The debris basin as proposed would remove several live oak and valley oak trees, as well as accompanying dry riparian vegetation.

South Babb Creek. The only significant impact on the flora of South Babb Creek will be in reaches 9 and 10, where the vegetation is now transitional between that of developed urban areas and dry riparian. Most of the plant species are cultivated, but they have become somewhat naturalized and have formed an integrated and aesthetically pleasing plant community with

a few native plants such as walnut and cottonwood. According to plans, this community is to be replaced by a concrete U-frame channel and box culvert.

Upper Penitencia Creek. Reach 9 of Upper Penitencia Creek now includes three sycamore trees where the trapezoidal channel is to be, but accompanying dry riparian vegetation is scarce. A large valley oak is located along the existing creek channel in this reach, but it will not be removed if the diversion is to be as indicated on the Maps and General Plans. From reach 18 to the end of the project, many sycamore, eucalyptus, and live oak trees and a few big-leaf maples occur in the area that is to undergo modifications that will remove most or all of these trees and all accompanying dry riparian vegetation.

Berryessa, Los Coches, Calera, and Lower Penitencia Creeks. The major impact on the vegetation of Berryessa, Los Coches, Calera, and Lower Penitencia creeks will be the loss of bottom riparian habitat. In addition, debris basins are planned at the ends of Berryessa and Los Coches creeks where existing sycamore trees may be removed. The debris basin site of Los Coches Creek also includes part of a stand of willows that may be cleared. Reach 7 of Calera Creek now supports a dry riparian community of many native and introduced species, and the proposed flood control improvement (concrete pipe) will destroy much of this community unless special measures are taken.

Yerba Buena Creek. This creek is to be left essentially in its natural state; therefore direct impacts will be minimal. Replacement of the three inadequate culverts will disturb some vegetation during construction, but large trees can be avoided.

North Babb Creek. The creek will lose bottom riparian vegetation and some small cottonwood and walnut trees, but there is very little other vegetation in the right-of-way.

Evergreen Creek. Only agricultural vegetation is to be disturbed in this project.

Ruby and Quimby Creeks. Small amounts of dry riparian vegetation are to be moved at the upstream ends of these creek projects. Downstream, only agricultural and grassland vegetation will be disturbed.

Penitencia East Channel. This channel will require only the removal of waste field vegetation and a small amount of agricultural vegetation near the end of the project.

Long-Term Impacts

Long-term impacts are direct and indirect effects that take place over a period of time after the initial construction is completed.

Removal of vegetation will cause an increase in the runoff rate, resulting in decreased infiltration and soil moisture. Humus will also be lost and the natural fertility of the soil will be lowered. This increased severity of conditions will cause increased stress on the remaining riparian existing plants and a further simplification of the plant community. Riparian vegetation will be replaced by plants adapted to a more severe environment. These impacts will extend to reaches of the channel not directly modified by flood control measures.

In plant communities directly modified by the project, colonization will begin in areas devegetated during construction. The colonizers are generally weeds that prevent native species from recolonizing. These weeds may spread to natural communities and cause indirect modification there. Eventually, native species will recolonize the area, but this will be in a much later stage of succession.

The bottom riparian community recovers fairly rapidly if measures are not periodically taken to prevent its regrowth. The concrete channel is the most difficult of the modifications to recolonize, but after sufficient silting the bottom riparian community can become reestablished even in a concrete channel.

Diversions leaving parts of a creek channel without water are extremely detrimental to the vegetation along the original channel. The portion of Upper Penitencia Creek to be diverted now supports a dense and diversified dry riparian woodland community. If the water is diverted from this channel, most of the existing plants will not be able to survive in the long run. In Fisher and Berryessa creeks, water is to be diverted from portions of the creeks that now support dense bottom riparian vegetation.

Removal of some of the levees in the baylands will allow a small area to become revegetated with salt marsh plants.

Incorporation of some of the more natural areas into the city park chain will have the positive effect of preventing further development and further destruction of vegetation, especially if the parks are left in their natural state.

Increased urbanization as a result of land rendered developable by the flood control improvements will further decrease agricultural and waste field ecosystems. Additional residential and industrial development will increase water and air pollution, both of which are detrimental to the existing plant communities. Increased population will also put an additional stress on natural plant communities for recreational use.

There will be a temporary loss of oxygen production and oxygen-carbon dioxide recycling, as well as a loss of the favorable effects vegetation has in removing some of the pollution from the atmosphere when the vegetation is removed. There will be some compensation in the future when replanting and

natural revegetation take place. When the area is urbanized, residential landscaping will provide a substantial amount of total vegetation. Although the plant communities will no longer be natural, lawns, shade trees, and garden plants will perform the function of oxygen cycling. It has not been determined if in the future the total vegetation or total leaf surface available for atmospheric gas exchange will be greater or less than at the present.

Fauna

When describing the general impacts of creek channelization upon the faunal community, both short-term and long-term effects must be considered. Short-term effects, principally noise, begin and end during construction. Most creek channelization impacts, although they may similarly begin with construction, persist long after the creek modifications have been completed. In this project, long-term impacts affecting the animal populations include: (1) sedimentation from construction and erosion after project completion; (2) decreased standing water and associated vegetation serving as mosquito breeding sites; (3) increased heavy metal and nutrient flow into the streams via storm water runoff; (4) faunal displacement due to vegetative removal during construction or subsequent urbanization; (5) recolonization of undesirable species; (6) alteration of the estuarine salinity gradient due to increased fresh water flow into the bay.

Construction noise will probably displace many birds and ground animals in the immediate area. Such displacement effects were observed in the area on Coyote Creek described on sheet 61 of the General Plan. Absence of wildlife in this area was directly attributable to construction clearing of the old Kaiser gravel pits. Renewed wildlife activity was evident downstream and upstream approximately one-half mile. Movement by displaced animals to similar or different habitats, however, alters the natural balance which has been established in these areas. Increased competition with their peers for reduced available habitat increases selective pressure on the animal population as available food is reduced. In addition, lack of preferred breeding sites and a limited food supply may increase mortality. Meanwhile, species more tolerant of noise may flourish in the habitat vacated by the animals disturbed by construction. If the displacement lasts long enough for a new ecological balance to be established in the construction zone (which is unlikely), displacement could be permanent. In general, though, if a suitable habitat remains, animals disturbed by noise should reestablish themselves in the area after construction.

The sedimentation load during construction of modified floodplains, modified floodplains with excavated channels, and earth channels along Coyote Creek will severely damage the resident fish species. Sediment from construction on the tributaries confluencing with Coyote Creek will add to this load. Besides concern for the unique California perch, obstruction of the occasional wild rainbow steelhead trout runs (which may already have been disturbed by the poor quality of the Coyote waters, especially towards the bay at the Milpitas sewage plant) and damage to sport fish represent significant adverse effects of siltation.

According to Martin M. Seldon, trout runs still occur in the fall when good water years correspond to the two- to five-year biological cycle characteristic of these fish. The adverse impact upon the other native fish will be just as severe.

Siltation continues after construction and is expected to increase along Coyote Creek as a result of the increased flow condition which channelization creates. Erosion along earth channel and modified floodplain reaches, as well as along natural channel areas, will persist for a while as a negative impact upon the fish and invertebrates of the creek, although the degree and length of this impact cannot be determined now. Siltation can harm fish populations by: (1) destroying the food resources (e.g., algae, invertebrates, detritus) of bottom feeders; (2) reducing O_2 levels due to the increased biochemical oxygen demand of the organic load; (3) having direct turbidity effects (e.g., making it difficult for the fish to find food; (4) destroying spawning grounds; and (5) adding a toxic load from the introduced sediment. According to the California Fish and Game Department, the brown bullhead may not be damaged by an increased sediment load, but in general each or any combination of these effects will be destructive. The silting, however, may not completely eliminate any of the species from Coyote Creek. Nonetheless, it will take at least a couple of years after construction is completed and normal flow is reestablished for the fish populations to recover, providing subsequent erosion is not severe. Depending on

sedimentation after construction, the flood control measures may eventually be beneficial to the fish. Increased flow, along with the ultimate decrease of the sediment load as a result of channel straightening and lining, and construction of debris basins, is definitely advantageous to fish populations.

Because sedimentation will reduce the present mosquitofish population, which is maintained by the Santa Clara County Health Department, one could expect mosquito populations to rise. Fortunately, however, the overall effect of the flood control improvements and subsequent urbanization will be to reduce the amount of standing water and therefore the number of mosquito breeding sites. This is especially true because most aquatic vegetation in which the mosquitoes thrive will be removed. This positive impact will be offset, however, if adequate inlets into the channels are not provided for collecting water outside the levees. *Culex tarsalis*, which carries encephalomyelitis, and *Aedes dorsalis*, a vicious biting marsh mosquito, would be of greatest concern in any mosquito population increase. Establishment of debris basins will not present a mosquito problem as long as bottom riparian vegetation is controlled. Midges, which can be seen flying alone or in large mating swarms anywhere near water, may flourish in the debris basin environment. These flies do not have a vicious bite, although they are often mistaken for mosquitos, and would present a problem only if any substantial midge population increase around the debris basin spread to adjacent residential areas.

A secondary effect of any localized increase in the mosquito population is an increased load of inorganic phosphate. These inorganic phosphates, along with various other fractions, would arise from the "nonresidual" organophosphates dispersed by the Santa Clara County Health Department to destroy mosquito larvae. If these fractions did return to the creek waters via soil percolation, stream eutrophication would be accelerated. Storm water runoff will also increase with urbanization, adding organic and inorganic pollutants to streams and further endangering aquatic life.

Faunal displacement is probably the most widespread impact of channelization. The magnitude of displacement is dependent upon the amount and type of vegetation destroyed. A 25-foot-wide concrete channel will have much more impact moving through a wet riparian or bottom riparian environment than through a waste field. The riparian woodland, bottom riparian, and bayland habitats are relatively scarce and continue to disappear gradually throughout California. In contrast, developed urban areas are rapidly expanding. Thus, for those animals which benefit from man's presence, such as the rock dove, mockingbird, Brewer's blackbird, robin, house sparrow, Norway rat, and house mouse, there will be more suitable habitat.

Although the agricultural, waste field, and grassland habitats are also declining, they are not comparably productive and within this project area do not support as many of the special status species as do other habitats. Most population growth inducement stemming from the project will cover the agricultural or waste field and grassland areas. The loss of seeds and fruit will affect the seed-eating (e.g., starlings) and fruit-eating (e.g., cedar waxwing) birds and mammals, with a subsequent increase in predation by the affected animals on remaining crop lands. In addition, removal of the grasslands will reduce the deer and field mice population on which the area's owls and hawks are extremely dependent. It is possible that such a reduction in deer and field mice habitats may result in an increased rodent population throughout adjacent residential areas. In general, the project will accelerate the transitions in Santa Clara County from foothill, field and stream animals to animals of the city.

The fauna associated with the bottom riparian plant community are particularly vital to the wildlife associated with several of the other habitats. This habitat is more directly affected by channelization than any other. It offers a substantial food source and dense cover. Removal of a creek's vegetation, along with the crevices and depressions in the creek bottoms, will eliminate the dwelling places of the aquatic larvae of many fresh-water invertebrates. Heavy siltation from construction, even without

channelization, will occlude these areas as well. Consequently, birds, reptiles, and amphibians of the riparian woodland and bottom riparian habitats, which thrive on insect populations, will not have food.

A related problem is presented by the underground reinforced concrete pipe improvements. The pipe will reduce the available surface water, so invertebrates and vertebrates will have less access to surface water. Fortunately, the reinforced concrete pipe is to be placed in the dry riparian habitats where most tree species (e.g., live oak and walnut) can survive on the annual rainfall, and are not dependent upon surface water. Nonetheless, with less water the present ground cover, and thus the dry riparian habitat, will be diminished along the creek. Consequently, the reinforced concrete pipe will reduce both the surface water and vegetative cover which the animals presently use.

The ultimate extension of habitat destruction and faunal displacement is the threat of extinction. Such is the case with the special status animals. Levees will bury pickleweed, reducing the available habitat for the red-bellied harvest mouse. Similarly, covering cord grass or cord grass and pickleweed mixtures may curtail least tern, black and clapper rail, and harvest mouse nesting habitats or may destroy existing nests outright. Pickleweed and cord grass do grow elsewhere in the South San Francisco Bay Area, and the animals of concern are capable of moving to these other areas before they are affected by levee fill. Construction noise will probably alarm them into such movement. The freedom of movement of these special status animals, however, is rapidly becoming determined strictly by habitat availability.

Recolonization by opportunistic epiphytic species will occur along the rock-lined and concrete channels. Microorganisms such as filamentous algae (e.g., Spirogyra and Cladiphora) will replace bottom riparian vegetation when slowmoving water is present in a rock-lined or concrete channel. The

problem of algal growth will be accentuated in areas where the creeks are widened and water is slowed so that the temperature is measurably increased. Eventually, if siltation is heavy, bottom riparian growth can be reestablished and a food web can be initiated once again.

The increased fresh-water flow into the bay will initiate another change. With more fresh water moving into the bay, the present salinity interface at the mouth of Coyote Creek will be moved outward, especially during winter. Consequently, the initial winter flood runoff will start an enlargement of the transition zone between the estuarine and marine invertebrates of the bay and fresh-water invertebrates.

In each of the flood control techniques, with the possible exception of the natural channel alternative, portions of, or total, plant communities will be destroyed along the length of a stream. In essence, this destruction will remove the animals normally associated with that type of vegetation. Therefore, in order to consider the impacts on fauna relative to specific project areas, the floral descriptions and Appendixes D and E must be consulted.

C. Socioeconomic Impacts

Population

The most profound socioeconomic impact of the project is that many people in Santa Clara County will be rendered physically safe from flood danger at their places of residence or business. It was noted in Section III that an estimated 91,000 persons (over 8 percent of the county's population) currently live in the floodable area. Table III-19 gave the "floodable population" estimate by planning area. Those planning areas are ranked below in terms of their affected populations:

Ranking	Planning Area		Affected Population
1	B	Evergreen	44,000
2	C	Alum Rock	18,500
3	S	Edenvale	14,900
4	E	Milpitas	8,700
5	F	Alviso	1,800
6	T	Coyote	1,200
7	G	Agnew	600
8	D	Berryessa	500
9	A	San Jose	200

The proposed schedule for construction of the flood control improvements is set forth in Figure II-10. The planning areas, or portions of planning areas, affected by each proposed improvement are listed in Table IV-17. Comparison of Figure II-10 and Table IV-17 reveals that although other factors were considered in scheduling the construction of these improvements, the primary factor was the safety of existing residents and

Table IV-17

PLANNING AREAS AFFECTED
BY PROPOSED CREEK IMPROVEMENTS

Creek Improvement	Planning Area	Ranking[a]
1. Berryessa	Milpitas	4
2. Silver	Evergreen, Alum Rock	1,2
3. N. Babb	Alum Rock	2
4. Thompson (Quimby to Aborn)	Evergreen	1
5. Coyote (US 101 to Metcalf)	Edenvale, San Jose (Total Areas)	3,9
6. Ruby	Evergreen	1
7. Quimby	Evergreen	1
8. Calera	Milpitas	4
9. Fowler	Evergreen	1
10. S. Babb	Evergreen	1
11. Coyote (Trimble to Silver Creek)	Berryessa	8
12. Lower Penitencia	Milpitas	4
13. Flint	Evergreen	1
14. Upper Penitencia	Berryessa	8
15. Los Coches	Milpitas	4
16. Coyote (Trimble to bay)	Agnew, Alviso	7,5
17. Coyote (Silver Creek to US 101)	San Jose	9
18. Evergreen	Evergreen	1
19. Thompson (Aborn up to urban res.)	Evergreen	1

Table IV-17 (continued)

PLANNING AREAS AFFECTED
BY PROPOSED CREEK IMPROVEMENTS

Creek Improvement	Planning Area	Ranking
20. Fisher (Stage 1)	Coyote (west side)	6
21. Coyote (Metcalf to dam)	Coyote (east side)	6
22. Thompson (from urban res. east)	Evergreen	1
23. Yerba Buena	Evergreen	1
24. Fisher (Stage 2)	Coyote (west side)	6

a. Ranking according to number of persons in planning area within floodable area.

their properties. The vast majority of affected residents would be protected from flood threat within the first six years of the project. In that period, essentially all of the existing residences in the Evergreen, Alum Rock, Edenvale, and Milpitas planning areas would be protected -- an estimated "floodable area population" of 86,700, or about 95 percent of the total floodable area population.

As county residents are freed from flood threat, their homes, other real property improvements, and belongings will likewise be rendered flood-safe. In the case of privately owned, taxable property, it has been established that the current estimated market value in the floodable area is approximately $720 million. (Included in this figure is the massive Eastridge Shopping Center.) The worth of vulnerable public buildings and facilities in the area would be in addition to this dollar total.

No estimate is made here concerning the probable losses to these properties in the event of a flood. Because of the unpredictability of possible total property damage, any analysis which attempted to quantify the impact of flood safety on these residences and commercial and industrial establishments would be purely conjectural.

Economic Impacts

The major beneficial economic impacts are: increased land values in both developed and undeveloped lands (with the inherent increase in county tax base), stimulation to the construction and materials industries, and elimination of the threat of vast economic losses to businesses and local residents should highways and/or local businesses be closed (whether or not actually damaged) for any period of time due to isolation by flood waters.

Major adverse economic impacts involve the costs of construction and continued maintenance of the proposed creek improvements and the necessity of relocating over 100 families.*

Tax Base

Current sales of undeveloped residential property all along the east side of San Jose have placed the value of this land at between $12,000 and $13,000 per acre. On the basis of local sales, and in the experience of area appraisers, freedom from flood threat has added an average of $3,000 to the worth of an undeveloped acre in this area. Obviously, an exact figure cannot be easily established due to the large numbers of variables that affect land prices. However, if $3,000 is taken to approximate the gain in worth of an acre of undeveloped residential land and is also assumed to be the approximate amount of gained market value of residential improved properties rendered flood-free, the overall gain in market value of these two classes of land could be approximated at $24.4 million, as follows:

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*The reader is referred to the discussion on relocation presented later in this section.

Undeveloped residential land

Gross acreage	=	5,400 acres	
Net residential acreage (75%)[a]	=	4,050 acres	
4,050 acres @ $3,000	=		$12,150,000

Developed residential land

Total developed floodable acreage	=	6,800 acres	
Net residential acreage (60%)[b]	=	4,080 acres	
4,080 acres @ $3,000	=		$12,240,000
			$24,390,000

a. Areas allowed for streets, services, parks, etc., in the largely developed east side of San Jose = 25%; San Jose Planning Department estimate.

b. Floodable areas take in relatively little land currently developed in industrial, commercial, or civic building uses. The San Jose General Plan estimates the area for streets, highways, parks, etc., in residential areas, city-wide, at 40%.

In the context of this admittedly gross estimate, therefore, the local tax base could be increased by over $6 million.

Project Costs

The estimated costs of the proposed creek improvements are presented in Table IV-18. It has been stated by the District that to finance a project this costly at a normal pay-as-you-go rate would take about 40 years. For this reason, a bond proposal is being considered which would accelerate this time frame to about 14 years. An examination of the District's budget for land acquisition and construction during the past five fiscal years bears out the contention that the 18 creeks in the East Zone could not be improved in as few as 14 years without a substantial financial boost. These budget totals for the fiscal years from 1969-1973 are indicated in Table IV-19.

Table IV-18

SUMMARY OF PROJECT COSTS
(Thousands of 1973 Dollars)

Project	Construction Cost	Engineering and Contingency	Right-of-Way Acquisition	Total
Berryessa	$1,565.0	$ 527.0	$ 615.0	$ 2,707.0
Silver	5,877.0	1,979.0	337.0	8,193.0
North Babb	53.0	18.0	2.0	73.0
Thompson (Quimby to Aborn)	212.0	102.0	400.0	714.0
Coyote (U.S. 101 to Metcalf)	1,348.0	455.0	714.0	2,517.0
Ruby	547.0	184.0	246.0	977.0
Quimby	693.0	234.0	338.0	1,265.0
Calera	863.0	291.0	146.0	1,300.0
Fowler	917.0	308.0	192.0	1,417.0
South Babb	595.0	200.0	90.0	885.0
Coyote (Trimble to Silver Creek)	1,696.0	571.0	990.0	3,257.0
Lower Penitencia	537.0	94.0	183.0	814.0
Flint	775.0	261.0	265.0	1,301.0
Upper Penitencia	1,653.0	557.0	2,444.0	4,654.0
Los Coches	466.0	157.0	23.0	646.0
Coyote (Trimble to bay)	3,986.0	1,342.0	9,600.0	14,928.0
Coyote (Silver Creek to US 101)	1,792.0	604.0	2,233.0	4,629.0
Evergreen	355.0	119.0	127.0	601.0
Thompson (Aborn to urban reserve)	318.0	102.0	200.0	620.0
Fisher	4,286.0	1,445.0	1,758.0	7,489.0

Table IV-18 (continued)

SUMMARY OF PROJECT COSTS
(Thousands of 1973 Dollars)

Project	Construction Cost	Engineering and Contingency	Right-of-Way Acquisition	Total
Coyote (Metcalf to dam)	$ 809.0	$ 272.0	$ 197.0	$ 1,278.0
Thompson (Urban reserve east)	--	--	200.0	200.0
Yerba Buena	91.0	31.0	11.0	133.0
Totals	$29,434.0	$ 9,853.0	$21,311.0	$60,598.0

Source: Santa Clara County Flood Control and Water District.

Table IV-19

CONSTRUCTION PROGRAM BUDGET,
SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT,
(TOTAL FOR FISCAL YEARS 1969-1973)

Zone	Land	Construction	Total
Northwest	$ 184,980	$ 2,620,152	$ 2,805,132
North Central	116,455	3,361,073	3,477,528
Central	559,974	5,932,266	6,492,240
East	1,021,606	3,351,917	4,373,523
South	1,737,684	977,066	2,714,750
Totals	$3,620,699	$16,242,474	$19,863,173

It is clear that even if the total District budget for all zones were devoted to construction within the East Zone alone, about 15 years would be required at the present pay-as-you-go rate to equal the estimated $60.6 million for this 18-creek project.

The scope of this EIR includes only the environmental impacts of the construction of the creek improvements themselves. The specific financial and fiscal impacts of the bond issue alternative for funding have been expressly excluded from consideration herein; also, a cost/benefit analysis of the project was not included in the scope of the study. Therefore, these cost estimates are merely being presented here, and the impacts treated will be only those of the expenditure of this amount of money over the time frame proposed.

Construction Employment

Project cost estimates have been broken down into three categories in Table IV-18: construction, engineering and contingency, and right-of-way

acquisition. Expenditures in the first two categories will affect the local economy by stimulating equipment and supply industries and by creating man-years of employment in the construction industry. While the first of these impacts is difficult to quantify, an indication of the extent of the second is presented here to suggest the magnitude of the impact of an expenditure of this type.

Table IV-20 outlines the amounts of construction expenditures which have been scheduled for each year throughout the term of the proposed project. In the project schedule it was indicated that a typical creek project takes three years. The first year is devoted largely to engineering, the second to right-of-way acquisition, and the third to construction. Therefore, in Table IV-20 the construction expenditures are concentrated in the years of completion of each improvement. Where a creek project is to be split into more than one reach, and is planned for completion over a number of years, the construction expenditures have been divided equally among those years.

Using current (1973) California average wages and work-years for this type of construction, the resultant man-years of jobs created are outlined in Table IV-21.

Table IV-20

CONSTRUCTION EXPENDITURES, BY YEAR
(Thousands of 1973 Dollars)

Creek Project	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	Totals
Berryessa	$1,565.0												$ 1,565.0
Silver	1,959.0	$1,959.0	$1,959.0										5,877.0
N. Babb			53.0										53.0
Thompson (Quimby-Aborn)		212.0											212.0
Coyote (US 101-Metcalf)		674.0	674.0										1,348.0
Ruby			547.0										547.0
Quimby				$ 693.0									693.0
Calera				863.0									863.0
Fowler				917.0									917.0
S. Babb				595.0									595.0
Coyote (Trimble-Silver Creek)					$1,696.0								1,696.0
L. Penitencia					537.0								537.0
Flint						$ 775.0							775.0
U. Penitencia						826.5	$ 826.5						1,653.0
Los Coches					466.0								466.0
Coyote (Trimble-bay)						996.5	996.5	$ 996.5	$ 996.5				3,986.0
Coyote (Silver Creek-US 101)										$1,792.0			1,792.0
Evergreen											$ 355.0		355.0
Thompson (Aborn-Urban Res.)											318.0		318.0
Fisher (Stage 1)											2,143.0		2,143.0
Coyote (Metcalf to dam)												$ 809.0	809.0
Thompson (Urban Res. East)												--	--
Yerba Buena											91.0		91.0
Fisher (Stage 2)												2,143.0	2,143.0
TOTALS	$3,524.0	$2,845.0	$3,233.0	$3,068.0	$2,699.0	$2,598.0	$1,823.0	$ 996.5	$ 996.5	$1,792.0	$2,907.0	$2,952.0	$29,434.0

Table IV-21

MAN-YEARS OF
CONSTRUCTION LABOR CREATED

Year of Project Completion	Man-Years of Construction Labor Created
1977	84.3
1978	68.0
1979	77.3
1980	73.4
1981	64.5
1982	62.1
1983	43.6
1984	23.8
1985	23.8
1986	42.8
1987	69.5
1988	70.6
Total	703.7

Source: URS Research Company. Calculations made using 1973 dollars. Percent of construction receipts going to labor is average of 33.3 percent. Of that amount, about 70 percent goes to manual labor and 30 percent to administration and office labor. (Source: U.S. Department of Commerce, Bureau of the Census, "1967 Census of Construction Industries," pp. 26-6, 26-7, 4-2). The hourly wage average used was $8.685, the average for "heavy construction except highway and street" in Engineering News Record, August 2, 1973, p. 27.

Relocation

Construction of all the proposed improvements will necessarily involve the condemnation and removal of many real property improvements now located within the proposed rights-of-way. The most significant of these required relocations will involve residences. According to current plans, 105 homes and apartments will have to be acquired by the District and the residents will have to be relocated to other area living units. At a rough average of three persons per unit, the project would directly affect the homes of about 315 people.

Over half of these units are located along both sides of the short stretch of Coyote Creek between Silver Creek and East William Street. The estimated 55 residences in this stretch are predominantly single-family units grouped in a low- to medium-low density area.

The District is empowered to condemn these units or to require that they be moved outside of a creek right-of-way (some lots are large enough to permit consideration of moving the house to another part of the same lot). Besides simple purchase of necessary lands and improvements, residents may qualify for reimbursement of certain relocation expenses. These are expected to average about $3,000 per unit and cover moving expense, down payment claims or rent supplements for eligible tenants, replacement housing claims for owners, interest differentials, and other moving expenses. Rules governing eligibility for these and other moving expense reimbursements are outlined in Appendix J. Location of alternate residences would not appear to be a problem. Roughly seven times as many dwelling units as will be displaced in this stretch of Coyote Creek are currently available for purchase in that area, as indicated in Table IV-22.

The remaining 50 families to be relocated are spread out over a wider geographic area which stretches nearly the full length of the floodable area. Similar relocation expense reimbursements would, of course, be available to them. It is assumed that they would also experience relatively little

difficulty in locating new homes in these areas, both because of their degree of dispersion and because of the relatively large number of new homes currently being constructed in the San Jose area.

Table IV-22

DWELLING UNITS CURRENTLY AVAILABLE FOR PURCHASE
IN THE COYOTE CREEK PROJECT AREA,
SILVER CREEK-WILLIAM STREET

Price Range	1 Bedroom	2 Bedrooms	3 Bedrooms	4 Bedrooms	5 Bedrooms	Totals
UNDER $ 6,000						
$ 6,001 to $10,500		1				1
$10,501 to $15,000	2	5		1	1	9
$15,001 to $20,000	2	21	12	3		38
$20,001 to $25,000		19	125	25	1	170
$25,001 to $30,000		4	57	31	3	95
$30,001 to $35,000		1	11	7	2	21
OVER $35,000		4	4	6	3	17
TOTAL	4	55	209	73	10	351

Source: Santa Clara County Flood Control and Water District.

The numbers of families to be relocated are listed by creek project and proposed relocation time frame in Table IV-23. No more definitive description of either the specific units or their current residents has been included in this report, as it was felt that most likely the needs, ages, and composition of the affected families would be different at the time of construction than they are today. It would be unnecessarily harsh to alarm current or prospective residents at this time. However, if plans are finalized, a system should be implemented to notify new home buyers and tenants of the impending plans for condemnation.

Table IV-23

HOUSING UNITS TO BE RELOCATED, BY CREEK PROJECT AND RELOCATION TIME FRAME

Creek Project	Housing Units	Time Frame
Upper Penitencia	13	1981-1982
Lower Silver	1	1976-1977
Thompson	13	1976-1987
Coyote:		
Bay - Silver Creek	10	1979-1985
Silver Creek - William St.	55	1984-1985
William St. - Dam	13	1976-1986
Total	105	

Land Use

Impacts on land use are basically indirect in nature and are relevant to the growth inducement influences of the proposed project. Therefore, Section X - Growth Inducement - of this report should be consulted for effects on land use.

Transportation

Direct Impacts

The project will have an impact on the 204 stream crossings listed in Table IV-24. Slightly less than half of these crossings will be undisturbed, while the District plans to rebuild or replace 50 and to construct 20 new crossings. The remainder (35) will be constructed in the future as they become needed. An individual crossing classification is provided in Appendix G.

During construction, normal automobile traffic will be disrupted and congestion will result. Alternate routings will be necessary, resulting in extended travel times. Mainline railroad traffic will not be interrupted, although slower speeds across temporary structures can be anticipated.

Indirect Impacts

Many of the structures to be reconstructed or replaced, and all of the new crossings, will facilitate access to areas for future development. Therefore, development of the project area and adjacent lands is likely to progress at an accelerated rate. With few exceptions (private crossings), these improvements are in accordance with the planning requirements of the cities involved and with those of Santa Clara County. Substantive efforts have been made by representatives of the District to ascertain current and projected traffic volumes to determine the required width for each structure.

The reconstruction of existing highway crossings and the construction of 20 new crossings will enhance vehicular mobility by improving access, providing flexibility for alternate route selection, and allowing a general reduction in travel time. These factors combine to encourage continued dependence on the automobile in Santa Clara County.

Table IV-24

CROSSING SUMMARY BY TYPE OF IMPROVEMENT

Creek	Crossing Classification[a] Undisturbed	Replaced	New	Future	Total
Coyote	36	10	3	17	66
Fisher	5	9		2	16
Silver	20	7	1	4	32
Yerba Buena	4				4
Thompson	5	8	1		14
Evergreen		1		5	6
Fowler			5	1	6
Quimby			1	4	5
Ruby			3		3
Flint		3	1		4
South Babb	2	2			4
North Babb	1				1
Upper Penitencia	6	3	1	2	12
Berryessa	5	5	1		11
Los Coches	8	1	1		10
Calera Creek	3		2		5
Lower Penitencia	4	1			5
Totals	99	50	20	35	204

a. Undisturbed crossings refer to existing crossings which are adequate and will not be affected by this project. Replaced crossings are those which exist but are inadequate either in height, width, or location. These will be reconstructed or replaced. New crossings are those where no current crossing exists and will be constructed under this project if agreement is reached with the appropriate jurisdictions regarding paying the costs of such construction. Future crossings are those planned by the cities and the county which will not be constructed under this project.

Completion of this project will allow the highway and rail system to remain operational during and following periods of heavy rainfall.

In general, future maintenance costs associated with saturated subgrades should be reduced, due to the contemplated drainage improvements. Isolated portions of levees adjacent to parallel roads could generate saturated subgrade conditions requiring increased maintenance and/or the imposition of temporary load limits.

Utilities and Urban Services

The flood control improvements will have little direct effect on the utilities if proper precautions are taken. There will be little direct impact on the electrical distribution system except that a few power poles will have to be relocated. If proper precautions are taken to avoid the pipelines where earth channels are to be excavated in their vicinity, there should be no effect on existing pipelines as a result of the flood control improvements.

The flood hazard will be removed from schools in the presently floodable area. Flood control improvements near schools may provide a hazard to school children if channels are made deeper. Even tall fences are not always effective in preventing children from drowning in creeks.

Indirectly, any increased urbanization and population growth made possible as a result of these flood control improvements will contribute to the rate at which existing utilities and services become inadequate.

Scenic and Recreational Impacts

The proposed East Zone flood control improvements will have major effects upon the scenic and recreational character of the creeks to be improved. The type and degree of these effects will depend a great deal upon the nature of the improvements themselves.*

In general, the intrinsic aesthetic merit of each type of channel improvement can be expected to correspond roughly to the degree of naturalness it preserves or creates in a particular visual setting. Primarily for this reason, the natural channel and the modified floodplain are the preferred types of channel where preservation of the natural environment is determined to be especially important, particularly in park chains or other recreation areas, and along scenic trafficways (see Figure IV-7). Although riparian naturalness may also be highly valued in other environments (particularly in residential neighborhoods), it is frequently difficult to provide, usually because the required width of right-of-way is restricted by adjacent urbanization.

The types of improvements which require the greatest alteration of the visual character of a stream include earth, concrete, riprap, and rock-lined and gabion-lined channels. These all require excavation and construction in the streambed which may vary in quantity and cross-section, but which result in a basically barren, uniform, and artificially symmetrical stream appearance (see Figure IV-8). Of these types of improvements the U-framed, or vertical wall, concrete channel requires the narrowest

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*For brief descriptions and illustrations of the types of channel improvements proposed, see Section II of this report.

Fig. IV-7 NATURAL CREEK CHANNEL

Fig. IV-8 TRAPEZOIDAL EARTH CHANNEL (a) AND CONCRETE CHANNEL (b)

right-of-way and so offers the greatest potential for preservation of existing trees and terrain (see Figure IV-9).

Another aesthetic disadvantage of these types of artificial channels is that for safety purposes they often require fencing, usually of the chain link variety. Although the visual effects of these barriers can be softened with planting, redwood battens, etc., fencing generally contributes to the inhospitable and unnatural visual quality of an artificially improved stream channel (see Figure IV-10).

Occasionally, where concrete channel improvements are particularly conspicuous, an attempt is made to improve their appearance by the application of "suitable color and design patterns." Unfortunately, this type of cosmetic treatment often deprives these "improvements" of their only redeeming aesthetic virtue, honesty. Although subtle, structurally integrated architectural treatment (such as the use of earthtone colors and texturization of concrete) by a professional trained in visual design may enhance the aesthetic quality of some channel improvements, decoration applied as an afterthought by an engineer not so trained will almost certainly result in an unfavorable visual effect (see Figure IV-11).

The pipe or concrete box type of improvement, which consists of a subterranean conduit, is proposed mostly where there has been no previously well-defined stream channel. Its right-of-way is generally marked by a surface maintenance road and can be landscaped to provide some visual amenity.

So far, the aesthetic characteristics of the proposed improvements have been discussed only with reference to the intrinsic visual qualities of each improvement type. However, the scenic and recreational impacts of the proposed channel improvements will depend not only upon their visual and physical qualities, but also upon the surrounding land use. Generally, the areas most sensitive to adverse visual impacts are those with high scenic or recreational value, such as parks and park chains; those with

Fig. IV- 9 VERTICAL WALL CONCRETE CHANNEL

Fig. IV-10 FENCE ALONG TRAPEZOIDAL CONCRETE CHANNEL

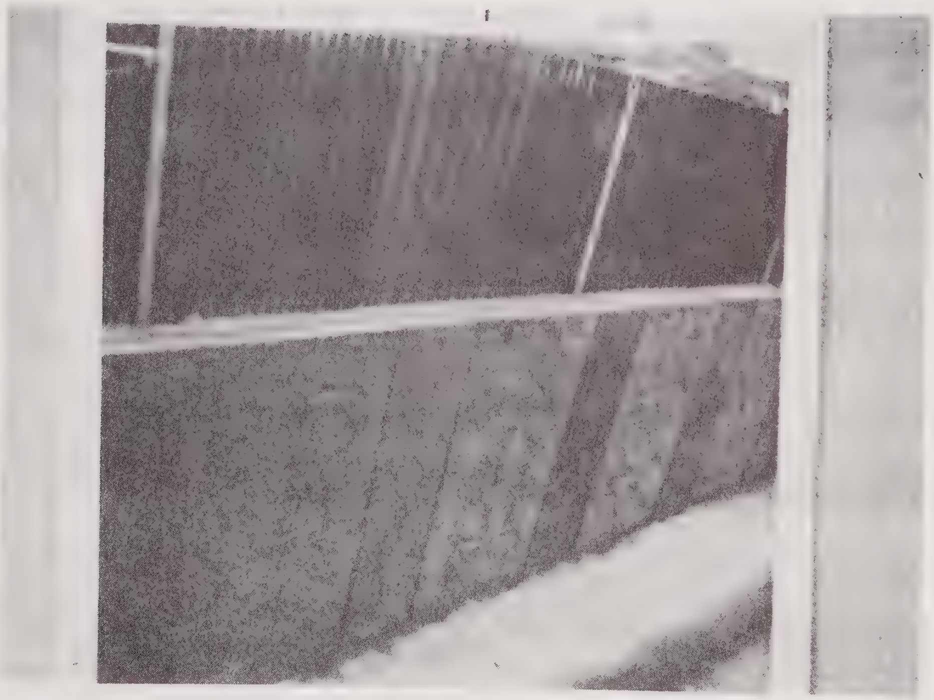

Fig. IV-11 DESIGN PATTERN IN CONCRETE CHANNEL WALL

high visibility, such as those that can readily be seen from residential areas and major trafficways; and those with high natural scenic quality (even if not designated for park use nor seen by many people).

Streams with somewhat less visual sensitivity generally do not occur in residential, recreational or otherwise scenic areas and are not seen by many people, or have already been modified or abused beyond recognition. Although there are few settings which are not improved by the presence of a natural, uncluttered stream, industrial and commercial areas are typically less sensitive to this type of amenity than are recreational and residential areas.

Because a detailed reach-by-reach discussion of the visual and recreational implications of each improvement type in each of its proposed locations would be both redundant and ponderous, the emphasis of the discussion of these implications is upon those areas expected to be most sensitive to the proposed improvements. Throughout this discussion, the reader may wish to refer to previous illustrations of the various proposed improvement types, and to Exhibit B which shows the proposed locations of each type. Figure II-10 will also be helpful to the reader in establishing the time frame in which the improvements are tentatively scheduled to occur.

As indicated earlier in this report, many of the creeks to be modified run through existing, planned, proposed, or possible parks and park chains. Two such chains which would be affected by the proposed channel improvements are the Coyote Creek Park and Upper Penitencia Creek Park. The length of the Coyote Creek Park chain is now substantially complete, according to the Open Space Element of the San Jose General Plan. This park chain, which is a joint project of the city, county, and state, runs along approximately 19-1/2 miles of Coyote Creek between Anderson Lake and the William Street Park in San Jose. According to the Park Plan (see Exhibit I), which was

proposed for and approved by the city and county recreational commissions in 1972, the modified floodplain type of channel improvement proposed for most of the creek between Anderson Reservoir and William Street Park is compatible with park development. The modified floodplain makes possible the preservation of the natural creek banks and riparian vegetation along the streamside. Although this type of floodplain section typically requires greater land acquisition than the trapezoidal channel design, the plan suggests that continued acquisition of the floodplain for park use, and construction of low earth levees along specific reaches of the creek, will meet both flood control and public open space criteria with a minimum of disruption to the creekside landscape. The only portion of the proposed Coyote Creek improvement which would be neither modified floodplain nor natural channel is a section of trapezoidal earth channel extending for approximately one-half mile below the confluence with Fisher Creek.

Similarly, most of the improvement to the Penitencia Creek Park portion of Upper Penitencia Creek (see Exhibit U) consists of modified floodplain. However, improvements to the portion of the creek east of Toyon Avenue and adjacent to residential development along El Grande Drive would consist of concrete and rock-lined channel. This situation is typical of that in which urbanization immediately adjacent to a floodable stream has preceded the stream's channelization to the 100-year flood control standard. The result is that the remaining available flood control right-of-way is too constricted to permit later installation of the potentially more attractive and recreationally usable modified floodplain improvement. Unfortunately, this situation is particularly common for creekside residential developments, and may result in a neighborhood's loss of a valued scenic amenity. The opportunity for preserving this amenity is lost not when flood control measures are installed, but when development of immediately adjacent property is approved. Creeks in the project area along which this situation has occurred include Lower Silver Creek, North Babb Creek, portions of South Babb Creek, Los Coches Creek, Berryessa Creek, and Lower Penitencia Creek.

As mentioned earlier in this section, the existing plans for the Coyote Creek and Penitencia Creek park chains are generally consistent with the modified floodplain type of improvement proposed for them. However, there are proposals for extensions to the park chain system which are not shown in these two park plans nor in the Open Space Element of the San Jose General Plan (see Exhibit K).

These proposals are reflected in the city staff task force report entitled "Report and Recommendations on Floodplain and Flood Control Policies," the City General Plan as amended in 1971, and the County Plan for Regional Parks. Although sufficient right-of-way could apparently be acquired, the improvements proposed for the creeks through these proposed and possible streamside parks are frequently not of the natural channel or modified floodplain type, and would therefore not be so compatible with recreational uses.

Proposed or possible streamside parks not shown in the city's Open Space Element, through which artificial channelization is proposed, occur along portions of Coyote Creek north of William Street Park; Berryessa Creek in the vicinity of Cropley Road; Thompson and Silver Creeks, approximately between the Holly Oak School and Marten Avenue; and Upper Penitencia Creek between Capitol Avenue and Coyote Creek (see Exhibit B). Although linear park and recreation uses may occur along fenced and artificially channelized streams, the water orientation and scenic quality of these areas is definitely compromised when this occurs.

Like creeks planned for park and recreation use, those which can be seen from a designated scenic road or highway must also be considered to be visually sensitive. This situation occurs in two locations in the project study area, once at the crossing of Bayshore Highway and Coyote Creek, and again on Thompson Creek along San Felipe Road upstream from Yerba Buena Creek. In both cases adjacent visible portions of the stream channels are to remain in their natural state, and no major visual change should result.

However, by default, the impact of "no change" may be negative for portions of these and other creeks, since no provisions are made for remedying previous private or public channel abuses (such as accumulation of litter, destruction of vegetation, etc.).

In the Evergreen area, the pipe or concrete box type of "improvement" is prevalent along the upper reaches of four creeks in the study area -- Fowler, Quimby, Ruby, and Flint. With this type of subterranean conduit, the waterway itself is not visible, but it is typically marked by a maintenance roadway and overflow drainage channel in the right-of-way above it. The scars in the landscape which are created by the required excavation and infill can be ameliorated with new vegetation and landscaping along the edges of the right-of-way, although this is not now systematically provided for in the preliminary engineering drawings. (It has, however, been provided for in the budget for engineering and construction.) In general, the visual impacts of this type of improvement should be less than those of the exposed, artificially lined channels, particularly after surface vegetation is restored.

A major conclusion of this section is that the scenic quality and recreational usability of a creek may best be enhanced or maintained where natural channel or modified floodplain improvements are installed. Other types of channel improvements tend to degrade the appearance of a stream channel and to reduce its amenity as a recreation resource. In order to mitigate the potential adverse visual and recreational impacts of the flood control improvements, the following general design measures have been proposed:

- The channel improvement types most compatible with scenic and recreation uses have been proposed for the existing and planned park chains along Coyote and Penitencia Creeks. However, along portions of these and other creeks where similar park uses have so far only been proposed, less compatible types of channelization are being considered.

- There has been provision for landscaping throughout the creek network. However, it is generally inconsistent. Insufficient landscaping is particularly significant where it occurs in visually sensitive areas such as parks and residential neighborhoods. Areas which are out of the public eye should be landscaped with hardy, indigenous, native species which require little or no maintenance.
- Molding and contouring earthwork, especially levees, pursuant to the city's recommendation will soften the general image of these improvements and contribute to their appearance of naturalness.
- Leaving only natural channel viewable from county-designated scenic trafficways will preserve the intent of that designation.

Archaeological and Historical Sites

Only one known archaeological site will be directly affected by the preliminary designs of the proposed construction, if construction activities remain within the proposed project area. This site is designated 4-SCI-54 and is located between Coyote Road and Coyote Creek northeasterly from the U.S. 101-Metcalf Road intersection. Other sites lie beyond the limits of the proposed project.

Another direct impact which must be considered is the possibility of there being subsurface or buried archaeological remains within the project boundaries. Should resources of this type exist in those areas which will be affected by construction activities, they may be damaged or destroyed.

The principal indirect impacts upon archaeological resources are generated by the introduction of people into the vicinity of those resources. These impacts may be summarized as follows:

1. Construction personnel or construction equipment may discover or reveal archaeological resources in the vicinity of the project.
2. Any park or recreational development concomitant with the project may introduce persons into the area who may discover and/or damage or destroy archaeological resources in the vicinity of the project areas.
3. The flood control project may make more land available for housing development by reducing the possibility of flooding, thus subjecting archaeological resources to possible destruction from this source.
4. Uncontrolled use of access and maintenance roads will make the area more open to indiscriminate public use, possibly resulting in the loss of archaeological resources in the vicinity.

There are no known historic sites or structures that will be adversely affected by the proposed project.

Section V

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF PROJECT IS IMPLEMENTED

V ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF PROJECT IS IMPLEMENTED

The direct and indirect adverse impacts of the proposed project which cannot be avoided or reduced to insignificant levels are:

1. The quality of the Santa Clara County air basin will be degraded. In the short term, particulates and gaseous emissions during construction of improvements will occasionally exceed state and federal standards for distances up to one mile from many of the construction sites, and will more frequently (and in some cases always) exceed standards for receptors bordering the construction site. The urbanization of areas protected from flooding will result in a long-term degradation of basin air quality, particularly along the eastern foothills and in the Coyote and Morgan Hill planning areas. There are likely to be some more localized increases in the frequency with which air quality standards are exceeded.

2. The water quality of the East Zone streams and the South San Francisco Bay will be degraded. During construction and the ensuing recovery period, sediment loads in the affected streams will be considerably increased. The large imbalance of cut over fill (more than 2,000,000 cubic yards) will create a considerable storage and disposal problem and will result in increased wind and water erosion and deposition on roadways by trucks. A significant amount of this material, originating primarily from erosion processes, will eventually find its way into creeks and, as a minimum, will increase maintenance problems. Aside from effects on water quality, this sediment may severely damage fish populations, primarily resident in Coyote and Upper Penitencia Creeks. The urbanization of areas made free from flood threat will result in increased pollutant levels in storm water runoff, degrading the water quality of East Zone streams and South San Francisco Bay.

Similarly, increased sewage plant effluent will also degrade the water quality of the south bay.

3. The increased hydraulic efficiency will result in an increase in the frequency of flood flows created by storms of lesser intensity. Under current project design, areas susceptible to such flooding would consist primarily of existing and planned parks and park chains partially or wholly located within the installed flood channels.

4. Riparian and salt marsh habitats will be destroyed, including approximately 10,000 trees of which approximately 97 percent are orchard trees, with concomitant displacement of associated fauna. This is considered significant because the loss of these types of habitats in the South Bay region and in the state represents the further reduction in an already limited and diminished resource. In these areas, considerable recolonization by undesirable species of flora and fauna is likely to occur. Simplification of remaining habitats and ecosystems will render them more susceptible to adverse impacts from other sources. Increased pollutant levels from increased urban runoff will have an unquantifiable but adverse effect on the fauna of the riparian habitats. Destruction of salt marsh and mudflat habitats will further endanger the survival of special status fauna.

5. In the short term, noise levels generated by construction activity will adversely affect approximately 970 residences, 20 commercial or industrial establishments, 14 recreational areas, and 2 schools.

6. Replacement of natural channels with artificial channels and installation of fences in some cases will result in loss of valued scenic amenities in various locations.

The judgment has been made that these adverse impacts cannot be mitigated to acceptable levels. This is not to say, however, that in many

cases the impacts cannot be significantly reduced; mitigating measures addressing these impacts are discussed in Section VI.

The direct and indirect adverse impacts which can be reduced to acceptable levels are:

7. The earth fill sedimentation-retention structures planned along the base of the foothills may be susceptible both to shaking and to surface rupture during significant seismic events, thereby increasing risk to life and property downstream if these events occur when these structures contain water.

8. Recharge of the unconfined aquifer will be reduced, resulting in lowering of the water table level.

9. As presently designed, water surfaces within levees are significantly higher during flood flows, in some limited local areas, than the elevations of surrounding lands. This may result in serious drainage problems unless resolved during final design.

10. Recharge of the confined aquifer will be reduced somewhat, which may potentially and adversely affect water supply and local subsidence.

11. Localized acceleration of channel and bank erosion will occur, particularly during the channel adjustment period immediately following construction.

12. The capacity of the San Jose/Santa Clara Sewage Treatment Plant is likely to be exceeded before the year 2000.

13. Approximately 105 homes will be eliminated by the project; this removal will affect approximately 320 East Zone residents.

14. The installation of flood control projects on upstream reaches or tributaries prior to installation of downstream flood control facilities will increase the potential threat to property and life due to flooding.

15. One known archaeological site may be disturbed, and there is a potential for disturbance of other, but unknown, sites. This known site is located between Coyote Road and Coyote Creek northeasterly of the U.S. 101-Metcalf Road intersection.

16. Vehicular traffic flow will be disrupted during construction and there is a possibility that increased congestion on current and planned roadways will result from future growth.

17. There will be accelerated demand for utilities and urban services in the areas newly rendered free from flooding. Such an effect may not of itself be adverse or significant, depending upon the utility or service in question. For example, schools already over capacity, or a water supply nearing a demand-supply balance, may impose undesirable constraints on the implementation of current and future public policies.

18. Diversions from existing stream channels will adversely affect riparian habitats and associated fauna.

19. Occasional adverse aesthetic impacts and public health hazards may occur in connection with debris basins where stagnant and/or standing water may harbor mosquitos or midges and/or may cause odors or other undesirable effects.

The determination of which of the above unavoidable adverse impacts can be mitigated to acceptable levels and what constitutes an acceptable level of impact is at times subjective where objective measures of acceptable impacts are not available. In such cases the determination has been

made by the staff of the URS Research Company based upon their independent and professional opinion. Ultimately, such determinations will have to be made by the cognizant public agencies.

Section VI

MITIGATION MEASURES PROPOSED TO MINIMIZE ADVERSE IMPACTS

VI MITIGATION MEASURES PROPOSED TO MINIMIZE ADVERSE IMPACTS

In most cases the mitigating measures proposed here to reduce adverse impacts do not represent a choice between alternatives, because no choice exists. Rather, the degree to which the proposed mitigating measures are implemented will govern the extent to which impacts are reduced. Many of the proposed measures will require the cooperation and action of other public agencies if they are to be effective.

The mitigating measures outlined below in some cases will be effective in reducing more than one of the adverse impacts listed in Section V. In these instances, the Section V listing numbers of the impacts are given at the end of the appropriate discussion.

1. Methods of reducing air quality impacts during construction generally involve better "housekeeping" at construction sites. These measures include:

   a. The use where possible of water or chemicals for dust control during land clearing or construction

   b. Application of water or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can give rise to airborne dusts

   c. Covering, at all times when they are in motion, open-bodied trucks transporting materials likely to give rise to dust

   d. Paving or stabilizing roadways and maintaining them in a clean condition

e. Reducing the total amount of area stripped of cover at any one time to the absolute minimum; in this case clearing may have to proceed in stages

f. Replanting exposed areas as soon as possible

g. Minimizing the handling of earth and the number of times it is moved

h. Assuring a balance between cuts and fills.

Mitigation of indirect air quality impacts involves three basic methods: (a) growth control and/or population restrictions; (b) transportation control through gas rationing, parking reduction, improved mass transit, etc.; and (3) elimination of traffic congestion, particularly at intersections, and during construction.

The adverse impacts that can be reduced by these mitigating measures are numbers 1, 2, 5, 8, 10, 16, and 17 of Section V.

2. Measures to mitigate impacts from storm water runoff during construction are:

a. Rigid application of seasonal constraints on construction. No grading or excavation should be permitted during rainy seasons, nor should operations be scheduled in such a way that unstabilized areas are left exposed during the rainy season.*

*For an exception to this, see Mitigating Measure 14b.

b. All surfaces disturbed or constructed should be stabilized as soon as possible by revegetation or using other techniques applicable to the specific locality.*

c. All areas of spoil disposal and/or stockpiling must be protected from soil loss during rainy weather, either by perimeter barriers and low slopes or by revegetation.

Impacts reduced by these mitigating measures are numbers 1, 2, 4, 8, and 10 of Section V.

3. Mitigation methods for indirect storm water runoff impacts resulting from future growth include the measures indicated for indirect air quality impacts. Additional mitigation can be accomplished through various types of treatment of initial flows during storms. This may be accomplished by diverting the early portion of storm flows into the sanitary sewer system rather than into local receiving waters, or by providing for temporary retention of this flow in settlement basins prior to release to the sanitary sewers or directly to the receiving waters. The first method would make further demands on the capacity of the San Jose/Santa Clara Treatment Plant and would magnify impact number 12 (see Section V). The latter method would require increased maintenance and the subsequent problem of disposal of settlement basin material.

Impacts can also be mitigated by a highly coordinated and accelerated program of efficient streetsweeping and gutter catch basin maintenance and cleanout, especially prior to and during the wet season.

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*"Guidelines for Erosion and Sediment Control Planning and Implementation," Office of Research and Monitoring, U.S. Environmental Protection Agency, EPA-R2-72-015, August 1972.

Impacts reduced by these mitigating measures are numbers 2, 3, 4, and 14 of Section V.

4. The proposed construction schedule should be altered so that downstream channel improvements are completed prior to upstream or tributary improvements. This measure refers to impact number 14 of Section V.

5. City, county, and private developments within the immediate area of flood control facility construction should be coordinated to the fullest extent possible to minimize cumulative or successive impacts. This measure would mitigate impacts 2, 3, 4, 8, 10, and 16 of Section V.

6. Current project plans should be reevaluated to eliminate minor local ponding or acceleration of channel or bank erosion resulting from channel realignment or improper grading (impact 11, Section V).

7. Any rescheduling of the project should include consideration of the most efficient cut and fill operations. The schedule should include consideration of the most economical phasing of cut and fill excesses and deficiencies on both a time and a geographic basis. Careful planning, keeping the goals of the project in mind, should permit a minimum amount of stockpiling and off-site hauling.

Impacts reduced by this mitigating measure are numbers 1, 2, 4, 5, 8, and 10 of Section V.

8. Construction activities in, or upstream from, any of the areas currently used for confined aquifer recharge should be rigidly controlled. Generation of sediment due to construction may result in the clogging of these recharge areas and is unacceptable in any degree. Seasonal constraints are particularly important in preventing sediment-laden runoff from entering percolation ponds. In addition, operation of machinery in flowing creek beds must be minimized and every attempt must be made to prevent sediment and

dust from entering waterways or being susceptible to storm water flow. If such preventive measures are impossible, construction of temporary siltation structures may be required. Immediate revegetation and stabilization of banks, levees, and floodplains is also recommended.

Impacts reduced by this mitigating measure are numbers 1, 2, 4, 8, and 10 of Section V.

9. The addition of extra temporary storm water storage capacity within the system should be considered to provide an additional safety factor. Considerable storage capacity can also be added through proper design of roofs, parking lots, streets, storm drains, and drainage of landscaped areas (it is recognized, however, that this mitigating measure may require modification of local building codes). With additional capacity, peak flows may be reduced and runoff lag times may be increased.

Impacts reduced by these mitigating measures are numbers 2, 3, 4, and 14 of Section V.

10. A continuous water quality monitoring program in conjunction with stream flow gaging would indicate short- and long-term responses of the watershed during construction and operation of flood control improvements. Such a program would enable the early detection of adverse effects and evaluation of the effectiveness of mitigating measures. This program would also be useful in predicting maintenance requirements.

Impacts reduced by this mitigating measure include numbers 2, 3, 4, 8, 10, 11, and 14 of Section V.

11. The bottoms of concrete-lined channels should be constructed with "weep holes" or rock lining to provide additional aquifer recharge to compensate for recharge losses due to forebay channel lining. Rock lining would be

most desirable from the standpoint of sediment deposits promoting the re-establishment of bottom riparian habitats. Some decrease in hydraulic efficiency and increase in maintenance would result, but such disadvantages appear to be outweighed by the benefits.

Construction of small, supplementary, percolation ponds along lined channels would also offset recharge losses.

Impacts reduced by these mitigating measures include numbers 2, 4, 8, and 10 of Section V.

12. Continuous observation and preventive maintenance will eliminate problems with debris basins. Occasional spraying for mosquito abatement may be necessary, but elimination of standing water* through pumping is more desirable to minimize the application of organophosphate pesticides and to minimize unsightly vegetation and noxious odors.

This measure refers to impact number 19, Section V.

13. Additional detailed geologic mapping along the base of the eastern foothills in areas of planned debris and sediment-retention basins should be performed to verify the seismic safety of proposed sites. This refers to impact number 7, Section V.

14. The following mitigating measures apply primarily to impacts 4 and 18 of Section V. Some of these measures have been mentioned previously; however, they are restated here in the context of mitigating ecological impacts.

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*Water may be used for irrigation of plantings. See mitigating measure 14a.

a. The banks of debris basins should be extensively planted. Success with planting a vegetational fringe of grasses, legumes, and various small trees and shrubs around farm ponds in Santa Clara County has demonstrated that a substantial increase in wildlife activity is possible. The bottom riparian communities should be controlled in these debris basins, however, if mosquitos become a problem to the Santa Clara County Health Department.

b. In the baylands, levee construction schedules should be arranged to correspond to the nonnesting periods of endangered and rare species of fauna (this means construction during the fall and winter). Furthermore, an attempt should be made to reestablish plant communities, particularly pickleweed and cord grass, equal in area to those removed. People who move into houses near the baylands habitat as a result of flood control improvements should be informed about the endangered species in the area and the importance of maintaining the baylands in its natural state.

c. The loss of fish can be mitigated by restocking. All native fish (see Appendix Table E-5), mosquitofish, and desirable game fish should be planted after the major work on the Coyote Creek improvements is completed. In order to return the streambeds to their natural condition, it may be desirable to flush Coyote Creek by controlled flooding. Hopefully, such flushing action from Anderson Dam to the bay would remove excess silt while retaining the heavier bottom material (e.g., gravel). Adequate travelways should be provided, as well, to accommodate possible steelhead runs or other fish movements up- and downstream.

d. Wherever possible, shrubs and herbaceous ground cover and trees should be left undisturbed. When this is not possible, vegetation removal should be phased and limited to small areas at any one time. Exposed areas should be replanted with native species normally found in that locality so that the area will be restored to as near its natural state as possible.

e. Earth channels and levees should be reseeded as soon as possible with plants that normally occur on the banks of natural channels in that locality.

f. When water is diverted from existing channels, sufficient flow should be maintained through the original channel to prevent dessication of riparian vegetation. Natural channels should never be filled when the main flow is diverted. Where a pipe is to be placed under the existing channel, water flow should also be allowed in the original channel as currently shown in the General Plans and Maps.

g. Current plans should be re-examined, as there are local instances where slight realignments can cause less destruction of habitats. Debris basins on Berryessa, Los Coches, and Flint Creeks appear amenable to slight changes in orientation or location to avoid removal of existing sycamores and live oaks, for example.

h. Once postconstruction stabilization of the creek(s) has occurred, maintenance destruction of reestablished vegetation should be kept to an absolute minimum.

Impacts reduced by these mitigating measures include numbers 2, 4, 6, 11, 18, and 19 of Section V.

15. The following mitigating measures will reduce the impact from construction noise:

a. Keep the amount of material handling to a minimum and balance cuts and fills to the greatest extent possible.

b. Construction equipment must be equipped with effective mufflers that are properly maintained.

c. Construction should not occur within 1,000 to 2,000 feet, depending on local conditions, of a school in session.

d. No impact tools should be used in inhabited areas.

e. Construction schedules should minimize the amount of equipment on-site and running at any one time, and equipment should not be left with engines idling.

16. Relative to impact number 9, the improvements on Coyote Creek upstream from station 1135, between stations 55 and 68 on Upper Penitencia Creek, and between reaches 3 to 8 on Thompson Creek should be examined for potential drainage problems on adjacent lands. Other localities should also be examined where fills are to be placed which may not conform with surrounding elevations.

17. Future plans for the San Jose/Santa Clara Treatment Plant should be reviewed to ensure that there will be sufficient capacity to meet future demand. Measures to divert effluent to more appropriate receiving waters or to provide further treatment should be implemented.

These mitigating measures would reduce impacts 2, 4, and 12.

18. Implementation of the District's relocation policies will mitigate impact 13. See Appendix J in Volume II.

19. Traffic congestion can be minimized during construction through coordination with city and county traffic engineering personnel in the development of alternative routing plans. At no time should several successive crossings be closed at one time.

20. Growth policies and/or future plans for utilities and urban services should be reexamined to avoid creating, perpetuating, or magnifying overcapacity situations for these services.

21. The full extent of the archaeological sites of concern is not known, therefore, the full extent of impacts is not known. Subsurface testing under the direction of a competent archaeologist will be performed on site 4-SCI-54 to determine its full extent. As construction plans become more precise Mr. Chester King should be contacted regarding possible impacts upon the sites along Coyote Creek recorded by him. Plans for mitigation or eliminating any adverse impacts will be formulated. See Appendix H for fuller details.

22. Portions of creeks for which streamside parks have been proposed but not adopted or shown in the City of San Jose's Open Space Element should be re-examined to see if more compatible types of channelization may be possible. These proposed streamside parks are discussed on page IV-103. Additional general measures include molding and contouring earthwork, especially levees, to soften the general image of these improvements; develop a more comprehensive and consistent landscaping plan (see mitigating measure 14d); investigate alternatives to chain link fencing or at least soften the effect of this type of fencing with planting, redwood battens, etc.; assure a structurally integrated architectural treatment of concrete structures and channels by a professional trained in visual design.

The impacts reduced by this mitigating measure are 2, 4, and 6.

Only those mitigating measures listed above which the Santa Clara County Flood Control and Water District has the authority to implement have been used in determining which adverse impacts can be reduced to acceptable levels. The District in the past has demonstrated its willingness to cooperate with public agencies and private groups and individuals to formulate and enter into joint efforts. The District is willing to enter into further joint efforts to further mitigate the direct and indirect adverse impacts of the proposed project.

Section VII

ALTERNATIVES TO THE
PROPOSED PROJECT

VII ALTERNATIVES TO THE PROPOSED PROJECT

Five alternatives to the proposed project are discussed in this section, and their impacts are compared with those that would result from the proposed project. All alternatives other than doing nothing are variations on the theme of doing something, that is, of providing flood protection. Therefore, there is a considerable similarity in the type and degree of impacts which may occur. The following discussion concentrates on the differences in occurrence and degree of impacts.

The two alternatives most frequently and publicly discussed are the "do-nothing" and "pay-as-you-go" alternatives. Three additional alternatives are addressed in this report in an attempt to consider as broad a range as possible of "doing something" types of actions and environmental consequences. Two of the additional alternatives are termed "reservoir" and "floodplain zoning," and the fifth alternative is an attempt to combine those features of the other alternatives, as well as of the proposed project, which would eliminate or reduce the direct adverse impacts of the proposed project. These alternatives are less well defined in terms of economic and technical feasibility; however, this does not mean they are any less "real" for purposes of this EIR.

"Do-Nothing" Alternative

Under this alternative, no flood control facilities would be constructed in the East Zone. Consequently, the threat of flooding from the 100-year design flood would remain about the same or worsen for the estimated 91,000 residents of floodable areas. The threat of flooding from lesser storms would also still be present. The $60.6 million construction cost for the proposed project would be saved, but the 704 man-years of construction labor would not be realized. Aside from the hazards already mentioned, loss of flora and fauna would also occur in the event of a major flood, although recovery would be rapid, and many construction-related impacts would occur as a result of renovation of flooded areas.

Some negative aesthetic and ecological impacts might be increased as the possibility of private or public channel abuses (accumulation of litter, destruction of vegetation, etc.) increase with future growth. Existing, planned, or proposed streamside park chains would have their effectiveness compromised and their economic feasibility reduced if flood control projects were not carried out.

The other direct and indirect impacts resulting from construction and from induced growth attributable to the project would be avoided, however, growth-related impacts would occur to a lesser degree in the East Zone if development in flood-free areas is allowed to continue. Certain physical processes, such as erosion and sedimentation, would continue much as they presently do. Urban expansion outside the floodable areas would increase runoff and flood frequency. Because no flood protection would be available, incrementally increasing flooding could be expected. Channel erosion and resulting sediment problems requiring

technical and/or economic solutions would also increase in response to hydraulic modifications.

"Pay-As-You-Go" Alternative

This alternative is essentially a continuation of the current practices of the District, in that flood control facilities would be funded by tax revenues from the District's East Zone. Some facilities might be constructed by land developers at their expense, upon approval by municipal or county authorities, with the District's advice.

Most impacts under this alternative would be essentially the same as those for the proposed project, but they would occur over a longer period of time, thus decreasing the severity of impacts. Air quality impacts during construction could be reduced, since the amount of construction occurring at any one time would be less. But at the same time, water quality impacts during construction could be increased if the construction program is not well coordinated. If substantial development occurred in the vacant or developable lands bordering the creeks, direct construction impacts on air quality and noise probably would increase.

The time frame for construction of flood control facilities under this alternative has been estimated by the District at 40 years. Therefore the current population would be exposed to flood hazards for a longer time than if the proposed project is implemented.

As currently scheduled, partial flood control improvements would increase flooding hazards in some areas downstream of the modifications. Exposure of these areas to flood threat for several years might be unacceptable. Extensive replanning of the project might be necessary to eliminate such problems. As pay-as-you-go improvements would probably be in response to urbanization pressures, such replanning would be difficult under this alternative.

Erosion and sedimentation throughout the basin might increase if the proposed project phasing were utilized under the pay-as-you-go alternative or might decrease if a downstream-to-upstream phasing were used. In unimproved areas below channel improvements, erosion increases could be expected. The increased hydraulic efficiency afforded by the project would increase flow rates and volumes in downstream reaches and would probably induce channel and bank erosion. As long as upstream reaches were improved first, this downstream problem would exist and might worsen with each successive modification.

If project phasing were modified to proceed from downstream to upstream, erosion and sedimentation impacts would be reduced. Although the same areas would be susceptible to erosion, the total erosion load would be spread over many more years. This reduction in instantaneous load would give the assimilative processes of bay sediment transport and channel bedload more time to operate, thus reducing any shock-loading effects. Because a smaller area would be exposed to heavy rain during any single event, the probability of catastrophic erosion would be greatly reduced.

Lengthening the overall construction period would increase total maintenance requirements because the project recovery period would increase. As each reach was developed, it and all areas downstream of it would be susceptible to construction recovery sedimentation. Thus, maintenance costs due to construction would be significantly greater.

Extension of the project life would, to some degree, solve the problem of disposing of excess material. The annual generation of material suitable for fill would be less and this material could probably be assimilated in large part by other local construction requirements.

Indirect growth-related impacts would be altered; under the pay-as-you-go alternative potential growth rates would be reduced because lands

would be freed for development at a slower rate. It is extremely difficult (if not indeed meaningless) to project growth-related impacts over a 40-year period, as future technology and government regulations are unknown quantities. However, if it is assumed that present and known technology and regulatory trends continue, then approximately the same degree of growth-related impacts would occur as with the proposed project. It must be recognized, however, that a delay in growth would provide greater opportunities for the development of technologies and/or the formulation of public policies and regulations which would significantly reduce the adverse environmental effects of growth.

Reservoir Alternative

A number of preliminary studies have been conducted to evaluate the feasibility of constructing local reservoirs. Table VII-1 has been prepared from a compilation by the Santa Clara County Flood Control and Water District of results of investigations of East Zone sites. As indicated, most of these investigations were concerned only with water conservation. Any reexamination would consider multipurpose uses, since the economic feasibility of construction is greatly enhanced if local reservoirs can serve more than one purpose.

Brief analysis of these studies and suggestions for other sites indicates that construction of certain multipurpose reservoirs could have significant impacts on East Zone flood control requirements. The following paragraphs describe the effects of certain reservoirs on downstream requirements.

Preliminary study has indicated the feasibility of further study of a multi-purpose flood control and water conservation reservoir on Upper Coyote Creek near the confluence of Los Osos Creek. A capacity of 40,000 to 60,000 acre-feet has been suggested. The main benefits, however, appear to be recreation and water conservation. Reductions in flood flows for lower frequency floods could be expected below Anderson Dam. However, for the 100-year flood while there may be some reduction just below Anderson Dam, there would appear to be little reduction in the design flows over most of the length of the creek.

The feasibility of an earth-fill dam on the upper reaches of Silver Creek has also been studied. A 2,500 acre-foot reservoir may be justifiable for water conservation and recreation purposes. Flood control benefits would appear to be small since the Silver Creek Diversion will solve most of the flood problems on Upper Silver Creek. Also, the contribution

Table VII-1

SUMMARY OF "EAST ZONE" RESERVOIR FEASIBILITY STUDIES

Reservoir		Capacity (acre-feet)	Flood Control Reserve (acre-feet)	Use	Agency and Date of Study	Comments and Recommendations
Arroyo de los Coches		3,500	--	Water Conservation	Cal. Div. of Water Resources, 1957	Project abandoned due to geologic problems
Coyote Creek	I	60,000	--	Water Cons.	Thesis, 1931	Physically feasible; possible economic problems
	II	60,000	--	Water Cons.		
Coyote Creek	I	74,350	--	Water Cons.	SCCFCWD, 1970	Further study required
	II	N.A.	--	Water Cons.		
	III	37,250	--	Water Cons.		
Penitencia Creek	I	2,000-4,000	0-1,500	Multipurpose	Student paper (?), 1964	2,000 acre-foot, single-purpose reservoir with no flood control reservation recommended; study probably based on insufficient data
	II	N.A.		Multipurpose		
	III	2,000-6,000		Multipurpose		
Penitencia Creek		4,500	N.A.	Multipurpose	SCCFCWD, 1956	Appears feasible; additional study recommended

Table VII-1 (continued)

SUMMARY OF "EAST ZONE" RESERVOIR FEASIBILITY STUDIES

Reservoir		Capacity (acre-feet)	Flood Control Reserve (acre-feet)	Use	Agency and Date of Study	Comments and Recommendations
Penitencia Creek	A	N.A.	250	Flood control	Univ. of Calif., 1967	Preliminary study; Sites B and D eliminated on preliminary cost estimates; further study recommended
	C	N.A.	1,180	Flood control		
Penitencia Creek	A	1,200	N.A.	Flood control	SCCFCWD Consultant, 1959	Apparently not economically feasible
	B	1,730	N.A.	Multipurpose		
	C	N.A.	N.A.	Multipurpose		
Silver Creek		N.A.	N.A.	Water Cons.	Student paper, 1957	Inadequate study
Silver Creek		2,500	--	Water Cons.	SCVWCD, 1956	Should receive further study
Silver Creek		31,700	--	Water Cons.	Cal. Div. Water Resources, 1957	Information incomplete

Source: Santa Clara County Flood Control and Water District.

of flow from the Silver Creek Diversion to Coyote Creek is not significant under design flow conditions. However, the dam, which would require 700,000 cubic yards of earth fill, might alleviate the problem of disposing of excess material excavated along the creeks.

Several sites have been studied for dams on Upper Penitencia Creek, with reservoir capacities ranging from 2,000 to 4,500 acre-feet. Smaller reservoirs have been suggested for construction close to the confluence of the north and south forks of the creek. Such reservoirs could cover part of Alum Rock Park, possibly increasing its recreational attractiveness if problems of access could be resolved. A potential upstream reservoir site is located on the south fork of the creek, about one mile upstream of the south fork falls. A multipurpose reservoir for water conservation, flood control, and recreational purposes may be feasible. Additional detailed engineering and geologic studies would be needed to determine the actual feasibility. The site is close to the active Hayward-Calaveras fault zones, and the seismic danger would have to be evaluated before a final dam site could be selected. A preliminary evaluation of geologic and seismic dangers, however, appears to make construction of these dams very unlikely.

A reservoir feasibility study has also been made for a site in the hilly reaches of Los Coches Creek. This is an area of seismic and geologic instability, but if this project proved feasible, it could reduce the need for flood control improvements along the creek.

Apparently no feasibility study has been made for a reservoir in the hilly reaches of Berryessa Creek, but this possibility should be investigated. If a suitable site were found, peak flows on the creek could be reduced, which would reduce the magnitude of flood control improvements needed along the creek.

The other streams in the East Zone are relatively small, and it is unlikely that they offer any suitable reservoir sites. Therefore, flood control improvements would still be required along these creeks.

As can be seen, the use of reservoirs appears to offer little help in reducing flood flows in any significant amount and their further use in the East Zone would appear to be mainly for water conservation and recreation purposes.

Floodplain Zoning Alternative

Floodplain zoning involves buying potentially floodable areas and restricting their uses. Acceptable uses would generally be as open space or for recreation, but this would not eliminate other uses or development if such developments could be made "flood-proof."

The current market value of developable land in the floodable area is approximately $65 million. The current market value of privately held developed land and improvements is approximately $800-$850 million. Floodplain zoning would still require stream channelization in the floodable areas that are already developed, unless these areas were also purchased and their land uses were made compatible with floodplain restrictions. This would require relocation of residences, commercial establishments, roadways, and utilities.

In general, only a few portions of the East Zone are suitable for floodplain zoning, which is applicable primarily in undeveloped areas. The design problems involved in a mixture of floodplain zoning and stream channelization on a particular stream can be significant, because the two flood control techniques are not always hydraulically compatible; at times this would require construction of transition or other special-purpose structures. Also, much of the existing drainage system in the East Zone is already channelized or developed to some degree. Where there are existing levees, bank overtopping during floods will result in impounded water and subsequent drainage problems when flood peaks have passed.

The low-lying areas surrounding the downstream portions of Coyote Creek, including Alviso and many commercial and municipal facilities, would be susceptible to inundation under floodplain zoning. The proposed channelization and levee improvement appears a more realistic solution for the

low-lying areas. However, floodplain zoning, particularly in the salt marsh areas, would greatly reduce the loss of this valuable habitat and associated special-status fauna unless the dike construction required to protect existing facilities resulted in an equal or greater loss of habitat than that required for the modified floodplain planned for in the proposed project.

The small, intermittent streams such as South Babb, Flint, Ruby, Quimby, and Fowler creeks are not well defined in the East Zone. Flood control and public safety can be provided in these areas by floodplain zoning, but the direct environmental impacts resulting from the construction of other facilities, such as bridges and roads, to accommodate the sheet flows from these creeks may be on the same order as those that would occur under the proposed project.

The land around Fisher Creek is primarily agricultural. Currently it is subject to periodic flooding by storm flows, or to localized flooding when the water table surfaces. Floodplain zoning would essentially preserve the current status. As these lands are not slated for immediate development, floodplain zoning in this area appears feasible.

Upper Penitencia, Silver, Thompson, and Berryessa creeks have reaches suitable for floodplain zoning, but design problems and problems of acquiring some developed lands would have to be resolved.

In summary, there are certain areas, primarily on undeveloped lands, where floodplain zoning would result in the reduction of some direct and indirect environmental impacts. In addition, there would be a clearly beneficial effect on scenic and recreation environments in the East Zone. This alternative would make it possible to retain streamside land in public open space, would potentially assist in the realization of city and county streamside recreation and open space plans, and would help preserve

and enhance the creeks' present visual qualities. Areas of riparian habitat would remain undisturbed, and in particular, the salt marsh areas with their special-status faunal species might be preserved.

Some adverse construction-related impacts (noise, air and water quality, etc.) would still occur or be increased in local areas where transition or special hydraulic structures would be required to accommodate flows from floodplains to channels or vice versa. Long-term erosion and sedimentation problems might be increased. Also, riparian fauna might be disturbed in floodplain areas where active recreational or other activities were permitted.

Indirect growth-related impacts would be reduced, particularly if floodplain zoning were used to the fullest extent possible in the Evergreen and Edenvale planning areas. It is estimated that only about half of the potential induced growth might occur, as opposed to probable growth resulting from the proposed project, with attendant decreases in adverse impacts on air quality, water quality and noise environment.

Fifth Alternative

During the course of analyzing the impacts of the proposed project and evaluating relative impacts for the alternatives to the proposed project, a number of desirable environmental features of different types of flood control techniques were revealed. These options appeared to be amenable to combination into an additional alternative, which is presented here as a forum for discussion.

A system utilizing reservoirs with flood control reserves, floodplain zoning, and minimal channel improvements appears environmentally attractive. The major components of such a system would include primary reservoirs on Coyote and Penitencia creeks, with other facilities located on Silver and perhaps on Berryessa creeks. Undeveloped portions of Silver, Thompson, Penitencia, and Berryessa creeks would be floodplain zoned. The land so acquired should be used for parks and other activities compatible with floodplain zoning. In this way growth-inducing impacts could be significantly reduced, and riparian habitats could be preserved.

Because of the limited reductions in peak flows provided by the reservoirs, very little of the proposed flood control measures and their associated impacts could be reduced or eliminated. In addition, the somewhat reduced peak flows would have little effect on floodplain zoning feasibility since they would impact on areas where present plans call for some form of floodplain preservation. Floodplain zoning of the salt marsh areas would also be more practical as a means of eliminating the loss of this type of habitat. Channelization of the smaller, ill-defined streams would still be required.

Specifically, a combination reservoir/floodplain zoning/channel improvement system could be expected to have the following associated beneficial impacts.

1. A significant portion of construction activities could be shifted to the hill areas, thus reducing impacts in populated regions. Of course, these benefits would be partially offset by impacts associated with reservoir construction.

2. Reducing the requirements for flood control improvements in the valley would permit more efficient utilization of presently floodable areas. In particular, significant reductions could be realized along Coyote, Silver, and Berryessa creeks. Noise, construction inconvenience, dust generation, readjustment of bridges and crossings, and building material requirements would all be reduced.

3. Reservoirs could provide additional water conservation and recreational facilities needed in the northern Santa Clara Valley.

4. It is considered appropriate to use excavated earth channels on Fisher Creek to assist with water table problems in that area. Therefore, excess excavated material from Fisher Creek and the confluence region of Coyote and Silver creeks could be used for local earth-fill dams, thus reducing disposal problems. (The material would need to be tested for its suitability for this application.)

The principal adverse impacts are associated with the seismicity of the area and its implications for reservoir safety. A downstream flooding potential exists in the event of failure of any reservoir. A variety of physical (for example, erosion) and biological (loss of habitat, etc.) impacts would be associated with construction and operation of the reservoirs. In any feasibility studies, these impacts would need to be weighed against the potential benefits.

In developing this alternative, the following elements were included in addition to the basic concept, in order to reinforce the potential for reducing adverse effects and maximizing benefits. Most of these elements are already contained in the proposed project or have been outlined as measures formulated to mitigate adverse impacts of the proposed project.

- Dam construction would be designed to avoid seismic dangers and possible dam failures, as dam failure could be much more disastrous than any storm flooding in the valley. Active faults would be avoided in siting reservoirs.
- Excess lands along channels would be acquired and utilized for open space and parks.
- Small creeks and some reaches of larger creeks will still need channel improvements. In selecting the type of channels, the following priorities would obtain, in order to minimize ecological impacts:

    1. Natural channel and floodplain zoning
    2. Modified floodplain
    3. Earth channel
    4. Rock- or gabion-lined channel
    5. Concrete or masonry channel

- Locations of debris basins would be chosen to minimize soil stability and seismic dangers.
- Where levees are to be constructed, service roads would be located on levees to minimize excessive construction and road pavements along creeks. Existing roads along creeks would be utilized to the fullest extent possible.
- Where excessive levee heights cannot be avoided and water surfaces during peak flows may exceed the surrounding ground elevations, drainage could be a problem. In such cases a combination of levee and earth channels would be considered.

- On Fisher Creek, excavated earth channels would be appropriate for reducing the high water table that occurs in that area during the rainy season, but land use would be restricted to agricultural uses through zoning by local jurisdictions.
- Buried pipes in smaller and ill-defined creeks would be acceptable because their use would mean fewer visual impacts, fewer levees, and fewer transportation or pipeline crossing problems.
- No construction would be carried out during rainy seasons. Stripping of vegetation and exposure of soil would be limited to small areas at any one time, and areas would be promptly revegetated with native species, in coordination with a comprehensive landscaping program.
- Upstream channel improvements which would increase downstream flooding and/or erosion problems would not be permitted until downstream protection had been provided.

It is believed that from an environmental point of view, this alternative represents a possible approach to the problem of providing flood protection with a minimum of adverse environmental effect. Its technical or economic feasibility has not been determined.

Selection of Proposed Project

The "do-nothing" alternative was not considered acceptable because current threats to public health and safety would remain, as would the threat of substantial economic (property) loss. The "pay-as-you-go" alternative was not considered acceptable because it would not fill the immediate need for flood protection of developed and to-be-developed parts of the East Zone. The remaining alternatives did not appear acceptable primarily because of doubtful technical feasibility and unknown economic feasibility. Therefore, the proposed project was selected for evaluation in this EIR, because it provides the needed flood protection in an expeditious manner, appears to be the most economically feasible plan, and presents fewer technical difficulties.

Section VIII

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

VIII THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed project will free from flood hazard nearly 26,000 acres of land, of which 6,800 are presently developed, 5,000 are undeveloped and outside the urban services area, and 14,100 are undeveloped and inside the urban services area. For most of the land in the latter category, flood protection is the last "urban service" to be provided. The current estimated population in the floodable area is 91,000. An additional potential population of about 150,000 can be accommodated if the undeveloped areas within the urban services area are developed as indicated on the relevant General and Area Plans.

Other long-term direct effects of the project include an increase in hydraulic efficiency of East Zone streams which will decrease erosion and thereby decrease the sediment load in the streams. As a result of construction a significant amount of salt marsh and bottom riparian habitats will be removed, which will cause a decrease in the fauna associated with these habitats. In the case of the salt marshes the habitat for special species fauna will be decreased. Simplification of diversified habitats will occur as a result of construction and maintenance, with a corresponding increase in the susceptibility of these habitats to further impacts.

A number of indirect effects will occur as a result of urbanization facilitated by the project. Water quality of the streams and of South San Francisco Bay will be degraded as a result of increased pollutant loading of storm water runoff. Such pollutants tend to accumulate in the sediments of receiving waters and may eventually reach toxic levels. Pollution of the South Bay will also increase as a result of the increased quantity

of sewage treatment plant effluent. The air quality of the air basin will be degraded. Increases in the frequency with which air quality standards will be exceeded will be noted in some local areas within the urbanized region, and air quality will generally be degraded in the eastern foothills and the Morgan Hill and Gilroy areas. A general increase in average noise levels will also occur.

The reasons for constructing the project now are to obtain relief from existing flood threats and to remove a barrier to further development in accordance with established community goals as expressed in the several General and Area Plans.

Section IX

ANY IRREVERSIBLE ENVIRONMENTAL CHANGES INVOLVED IN THE PROPOSED PROJECT IF IT IS IMPLEMENTED

IX ANY IRREVERSIBLE ENVIRONMENTAL CHANGES INVOLVED IN THE PROPOSED PROJECT IF IT IS IMPLEMENTED

The primary irreversible change resulting if the proposed project is implemented will be the urbanization of approximately 19,000 acres of land; this would commit future generations to similar uses of the environmental resources. Fourteen thousand acres of this land now lie within the urban services areas of northern Santa Clara County, and in most cases flood protection will remove the last barrier to development. It may be argued that the relevant general and area plans now in existence represent a commitment to this change; however, without implementation of the proposed project or some alternate means of removing the flood threat from these lands, this change cannot occur to any appreciable degree. The effects of urbanization on the natural and physical environment would also tend to be irreversible. These effects include, but are not limited to, the degradation of air quality in the North Santa Clara Valley and in the Morgan Hill-Gilroy area, the degradation of water quality in the streams of the District's East Flood Control Zone and in South San Francisco Bay, degradation of the noise environment, and the destruction and/or degradation of wildlife habitats with concomitant destruction and/or displacement of fauna in the North Santa Clara Valley and South Bay regions.

Irreversible environmental changes and commitments of resources directly resulting from implementation of the project would include:

1. The hydrological modification of the East Zone stream system and the elimination of uncontrolled flooding.
2. Reduction of riparian habitats because of channel lining and maintenance, and loss of salt marsh habitats because of levee construction.

3. Loss of scenic qualities as a result of alteration of open and/or natural landscapes.

4. Reduction of public access to streamside areas through commitment of channels to flood protection uses except where parks or recreation facilities are incorporated. The reduction in public access will be primarily that which is currently considered unauthorized access over or onto private lands or public lands not held for that purpose.

5. Expenditure of energy (primarily petroleum products) and construction materials such as cement, aggregate, lumber and metal products, and earth fill materials.

6. Approximately 300 residents will be displaced through commitment of land to flood protection uses.

The probability of irreversible environmental accidents will increase because urbanization will lead to a greater number of sources of potential causes of such accidents. For example, erecting new storage facilities for hazardous and nonhazardous materials will increase the probability of damage from future seismic events. Other examples of accidents occurring during seismic events include failure of sediment control facilities with resulting release of impounded water, and the breaking of underground or surface pipes with release of gases or fluids. The possibility of environmental accidents will exist, such as spillage of fuel into streams or the breaking of underground pipes.

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Section X

GROWTH-INDUCING IMPACTS OF THE PROPOSED PROJECT

X GROWTH-INDUCING IMPACTS OF THE PROPOSED PROJECT

It was noted earlier that besides the 6,800 acres of developed land that would be freed from flood threat by the proposed project, an estimated 14,100 acres of undeveloped land in the urban services area and 5,000 acres outside the urban services area would also be protected. This undeveloped land is now in the following uses: agriculture (orchard or other types of cultivation), grazing, forest, brushland, or vacant urban.

The policies (both explicit and implicit) which have governed development of these types of lands in the past and which apply now were discussed at length in the subsection on community goals and plans. Growth policies, particularly those relating to population growth, are now being challenged, modified, or completely rewritten in cities all across the country. With the existing degree of uncertainty as to future growth policies in San Jose, Milpitas, and Santa Clara County, predictions of probable rates of development, and hence of population growth, resulting from this project would be meaningless. It is much more useful to estimate potential saturation populations in the areas to be freed from flood threat and then to compare these figures with the latest projections of growth for each planning area. This comparison makes it possible to estimate the portion of expected population growth in each planning area that might be attributable to this project. Finally, the rate at which both developed and undeveloped lands are expected to be protected from flood threat is indicated in a table that shows the proposed completion dates for the specific projects.

Under current policy, only lands located within established urban services areas are subject to any but extremely low-density residential development. For the undeveloped floodable land within the urban services area, potential saturation populations have been estimated in Table X-1. The formula for deriving the estimates is included on the table, and is explained

Table X-1

POTENTIAL POPULATION IN UNDEVELOPED RESIDENTIAL AREAS, BY PLANNING AREA -- 1973

Planning Area	Planned Land Use[a]	Gross Acres[b]	Net Factor (75%)[c]	Allowable No. of Units per Acre[b]	No. of Units[b]	Population Density per Unit[d]	Potential Population
San Jose	R-ML	130	97.5	7.9	770.25	4.3	3,300[e]
Evergreen	R-L	240	180	4.9	882	4.3	3,793
	R-ML	1,310	982.5	7.9	7,761.75	4.3	33,376
	R-MH	280	210	17.9	3,759	2.4	9,022
	R-VH	190	142.5	62	8,835	2.4	21,204
Subtotal							67,400[e]
Alum Rock	R-ML	130	97.5	7.9	770.25	4.3	3,300[e]
Berryessa			--	None --			
Milpitas	R-L	740	555	5.0	2,775	4.3	11,900[e]
Alviso			--	None --			
Agnew			--	None --			
Edenvale	R-ML	2,120	1,590	7.9	12,561	4.3	54,012
	R-MH	260	195	17.9	3,490.5	2.4	8,377
Sub-total							62,400[e]
Coyote[f]			--	None --			2,200
TOTAL POTENTIAL POPULATION							150,500[e]

7335

Table X-1

POTENTIAL POPULATION IN UNDEVELOPED RESIDENTIAL AREAS,
BY PLANNING AREA -- 1973

Source: URS Research Company.

a. As indicated in the "San Jose General Plan: 1966-2010."
b. Estimated.
c. The San Jose General Plan suggests that for planning purposes a city-wide figure of 40% of gross residential lands be used to account for lands for streets, highways, parks, etc. It was suggested by the San Jose City Planning Department that 25% would be a more realistic figure for the eastern, primarily residential, areas which are not expected to require large amounts of public facilities, highways, etc.
d. Average of several existing census tracts which were primarily developed in each specific density of residential development.
e. Rounded to nearest 100 persons.
f. The Coyote area is not covered by specific plans for controlling future development. The figure used for future growth is, therefore, that suggested in Table X-2.

in the footnotes. It is clear that the potential for the largest population growth is in the Evergreen, Edenvale, and Milpitas planning areas.

Table X-2 presents Santa Clara County's total population projections, by planning area, to the year 1990. It can be seen from Tables X-1 and X-2 that the estimated potential population of the floodable land within the Evergreen Planning Area (67,400) is greater than the County's projection of the population growth for the entire planning area by 1990 (58,400). Even so, both tables suggest that substantial growth is to be expected in this planning area in the next two decades.

Considerably more growth is predicted by 1990 in the Edenvale and Milpitas planning areas than could be accounted for merely by growth that could take place in currently floodable portions of those areas. The floodable portions, if developed to capacity, could account for just over 80 percent of the growth to 1990 in Edenvale and for 50 percent of that in Milpitas. This suggests that there might be a greater pressure for developing the newly flood-free lands in the Edenvale and Milpitas planning areas than those in the Evergreen area (where more developable land will exist).

Exhibit M indicates the areas floodable by each of the 18 creeks. Table X-3 presents estimates of the acreages of developed, undeveloped, and nonurban-service areas which would be protected by the projects scheduled for completion in each of 12 future years, according to the proposed construction schedule. Although the construction schedule is designed primarily to render over 90 percent of the developed floodable areas flood-free within the first six years, it will also protect undeveloped, planned-residential lands at about the same time. Undeveloped lands planned for "other" types of use (industrial, commercial, parks, and public lands) will be protected at a more even pace over the proposed time frame.

Table X-2

PRELIMINARY PROJECTIONS OF POPULATION GROWTH
BY PLANNING AREA: 1970-1990[a]
(Thousands of Persons)

Planning Area	Population 1970[b]	1980	1990	Predicted 20-Year Growth Persons	Percent
Subject to Flooding from East Zone Creeks					
San Jose	225.7	259.8	276.1	50.4	22%
Evergreen	50.9	72.6	109.3	58.4	115
Alum Rock	51.1	65.2	78.4	27.3	53
Berryessa	11.6	30.2	50.0	38.4	331
Milpitas	34.6	50.0	58.2	23.6	68
Alviso	6.5	9.8	18.2	11.7	180
Agnew	18.8	18.3	17.5	(1.3)	(7)
Edenvale	44.3	68.7	118.6	74.3	168
Coyote	1.4	2.2	3.6	2.2	157
Not Subject to Flooding from East Zone Creeks					
Santa Clara	83.3	90.4	93.7	10.4	12
Campbell	89.1	105.4	105.0	15.9	18
Los Gatos	48.0	56.1	68.9	20.9	44
Saratoga	27.5	35.1	38.2	10.7	39
Cupertino	92.3	110.9	124.5	32.2	35
Sunnyvale	70.0	82.7	93.8	23.8	34
Mt. View-Los Altos	77.2	87.0	87.8	10.6	14
Palo Alto	67.9	67.5	65.3	(2.6)	(4)
Los Altos Hills	11.4	17.8	20.4	9.0	79
Lexington	2.8	5.0	9.2	6.4	229
Almaden	21.3	25.7	41.0	19.7	92
Llagas-Uvas	1.2	1.8	2.7	1.5	125
Morgan Hill	7.6	15.6	28.5	20.9	275
San Martin	2.5	5.9	8.0	5.5	220
Gilroy	15.4	21.5	39.7	24.3	158
Diablo	0.0	1.6	2.1	2.1	--
TOTALS: Santa Clara County	1,062.4	1,306.8[c]	1,558.7[c]	496.3	

Table X-2 (Continued)

PRELIMINARY PROJECTIONS OF POPULATION GROWTH
BY PLANNING AREA: 1970-1990[a]
(Thousands of Persons)

Source: County of Santa Clara Planning Department, "Population and Housing Units by Planning Area, 1970, and Preliminary Projections for 1980 and 1990: Santa Clara County." These moderate projections represent an average annual in-migration of about 10,000 persons.

a. Totals may not add, due to rounding.
b. County of Santa Clara Planning Department, "Revised Total Population and Total Dwelling Unit Counts, Planning Areas, Santa Clara County, April 1, 1970, and Trends 1960-1970," June 25, 1973.
c. Includes 24,000 population not distributed by planning area.

Table X-3

ESTIMATED ACREAGE PROTECTED FROM FLOODS,
BY YEAR OF PROJECT COMPLETION

Project Completion Date	Type of Land				
		Undeveloped			
	Developed	Planned Residential	Planned "Other"	Outside Urban Services Area	Totals
1977	600	600	1,250	--	2,450
1978	250	500	--	--	750
1979	4,100	3,450[a]	1,450	450	9,450
1980	400	850	100	--	1,350
1981	700	--	1,000	--	1,700
1982	250	--	--	--	250
1983	--	--	400	--	400
1984	--	--	--	--	--
1985	450	--	3,500	--	3,950
1986	--	--	800	--	800
1987	--	--	50	--	50
1988	50	--	150	4,550	4,750
TOTALS:	6,800	5,400	8,700	5,000	25,900

Source: URS Research Company. These figures are necessarily rough estimates because of the difficulty of determining where in the floodable areas the influence of one creek ends and that of the next creek begins.

a. Represents areas freed from flooding by completion of projects on Coyote Creek between U.S. 101 and Metcalf Road, North Babb Creek, Ruby Creek, and Upper Silver Creek. Planning areas are Edenvale, Evergreen, and Alum Rock.

It is important to point out that the majority of residentially developable lands which are currently floodable are interspersed among developed properties. The fact that both developed and developable lands will be rendered flood-free simultaneously is therefore an unavoidable result of dealing with areas that have been developed in a patchwork fashion.

The only significant portion of developed or undeveloped floodable land which is currently outside of the urban services area lies in the Coyote Planning Area. It has been pointed out that no existing general plans define that area (except for certain lands around Lake Anderson) as planned for development or urban services within the foreseeable future. The area is largely in agricultural use today. Protecting the area from possible floods will undoubtedly remove one barrier to its development, but several other substantial barriers would still remain. Chief among these would be the policy of restricting development to areas covered by urban services. These services could be extended to the Coyote Area, of course, and there are plans to extend a trunk sewer line to the aforementioned Lake Anderson area. But current policies to develop prime areas already so served, which have thus far been missed in Santa Clara County's patchwork pattern of growth, indicate that such a move would be limited in the immediate future. As pointed out earlier, existing floodable undeveloped urban service areas alone have the capacity to provide for an extremely large proportion of the expected future growth on the east side of the county.

The growth-inducing pressures resulting from the project act in concert with already existing pressures, particularly to accelerate the conversion of agricultural lands to other uses. The majority of agricultural land use within the floodable areas is concentrated in the Berryessa, Agnew, and Evergreen planning areas, which lie within the urban services area, and in the Coyote planning area, which is outside the urban services area. The Evergreen area is planned for residential land use, whereas the Berryessa and Agnew areas are planned for industrial or commercial uses. The Coyote area is

expected to experience slow development unless urban services are extended. The threatened economic viability of agricultural lands represents an already existing pressure to convert these lands to more productive uses. This is particularly true in the Evergreen area, where the majority of the agricultural lands are planted in orchards. Orchards are particularly questionable as regards their economic viability, and are prime candidates, as in the past, for conversion to other land uses. Thus the growth-inducing aspects of this project will have a particularly vulnerable target in the agricultural lands within the urban areas.

It has previously been discussed that future growth in the East Zone and surrounding areas will be controlled by the policies and plans of the cities of San Jose and Milpitas and the County of Santa Clara. Implicit in this statement is the fact that these agencies have the basic means to modify the growth-inducing influences of the proposed project. However, other factors may supersede and/or reduce the growth-inducing impact of the proposed project.

The Environmental Protection Agency, as the result of a federal court decision, has recently proposed regulations governing the amount of allowable air quality degradation for areas that have air quality better than that specified in current state and federal standards. These proposed regulations vest considerable power in the hands of state and local agencies such as the Bay Area Air Pollution Control District (BAAPCD). The limited monitoring program conducted for this study indicated that concentrations of primary pollutants are now very low in the eastern foothills. Further, the impact analysis indicates that these air pollutant levels would increase substantially. Recent statements by the BAAPCD indicate that only minimal increases in air pollution levels would be permitted in areas that now have good air quality. Therefore, the implementation of air pollution control regulations, if current trends in public policy continue, would have a substantial impact upon the growth-inducing impacts of the proposed project.

In summary, the proposed project will have a substantial growth-inducing impact. The magnitude of this impact, however, cannot be precisely determined, and it is dependent upon the policies of public agencies other than the Santa Clara County Flood Control and Water District.

Section XI

AGENCIES AND INDIVIDUALS CONSULTED

XI AGENCIES AND INDIVIDUALS CONSULTED

The advice and assistance of the staff of the Santa Clara County Flood Control and Water District was extremely valuable in completing all aspects of this EIR. In particular, URS Research Company wishes to acknowledge the help of the following District personnel:

Bernard Goldner
David Gill
James Melton
John Richardson
Carroll Church
Richard Gates
Ronald Johnson
William Carlson
Sheikh Buksh

Numerous other agencies and individuals were consulted during the course of this study and were very helpful to the project team. They include:

Santa Clara County Planning Department
- Richard Hall
- Robert Sturdivant
- John Howe
- Rans Brattan
- Arthur Ogilvie

San Jose City Planning Department
- Gary Schoehaur

Milpitas City Planning Department
- David Clemens

San Jose Parks and Recreation Department

Howard Wright

Santa Clara County Health Department

Keith Kraft

Morgan Hill City Planning Department

Gary Coates

City of San Jose Environmental Commission

San Jose/Santa Clara Water Pollution Control Facility

Milpitas Water Pollution Control Facility

U.S. Geological Survey

Bay Area Air Pollution Control District

California Air Resources Board

U.S. Weather Service, Baltimore, Maryland

Air Pollution Control Division, Las Vegas, Nevada

Donald Arkell

Wildlife Management Branch, Fish and Game Department, State of California

Frank Fisher

Howard Leack

California State University, San Jose

Ronald Stecker

Richard Main

The Audubon Society

Frank Farran

Emanuel Taylor

Nancy Holmes

Bay Area Archaeological Cooperative

Chester King

Linda King

Michael Moratto

Paul Schumacher

Winfield Henn

Mr. Gertz

Mr. Nevin

Prof. Charles W. Gruber, University of Cincinnati

David Ensor, Meteorological Research Institute

James Moore, Dryden Engineers

VOLUME I . . .

Section XII

VIEWS OF LOCAL GROUPS

XII VIEWS OF LOCAL GROUPS

The views of local groups and individuals were solicited in a number of ways, some of which resulted in active consultations with groups and people listed in Section XI. The most formal method employed was to send letters to a number of groups, agencies, and individuals to solicit their views on the proposed project. These brief letters, a sample of which follows, were designed to obtain initial reactions to the project and its environmental consequences.

The distribution list for these letters is provided here, together with the written responses received. Because it was not possible to supply even preliminary study findings in the letters, these responses should not necessarily be construed as complete or final expressions of the views of the respondents.

The environmental concerns expressed in these responses have been addressed in this Environmental Impact Report in a manner which it is hoped will be responsive to these concerns. Questions raised as to the merits of the project were referred to the Santa Clara County Flood Control and Water District for appropriate response.

URS RESEARCH COMPANY
155 Bovet Road, San Mateo, California 94402
(415) 574-5001 Cable: URSYST

A URS Systems Affiliate

August 10, 1973

This letter is being sent to groups and citizens who have demonstrated their interest in contributing to the planning of public works projects with potential for having a significant impact within Santa Clara County. It is a request for initial reaction to a new proposal.

The Santa Clara County Flood Control and Water District is currently proposing a bond issue to help finance the construction of flood control improvements on eighteen (18) stream channels in the District's East Zone. As part of an extensive preliminary study effort, the District has contracted with URS Research Company of San Mateo for an Environmental Impact Report (EIR) concerning the proposed stream channel improvements. URS is a recognized authority in analysis of project impacts upon both the physical and the socioeconomic environment.

Flood control improvements are proposed on the following East Zone stream channels:

Coyote Creek	Flint Creek
Lower Penitencia Creek	Ruby Creek
East Penitencia Creek	Thompson Creek
Calera Creek	Quimby Creek
Berryessa Creek	Fowler Creek
Los Coches Creek	Evergreen Creek
Penitencia Creek	Yerba Buena Creek
Lower Silver Creek	Fisher Creek
North Babb Creek	South Babb Creek

Exact construction timetables and phasing have not been agreed upon to date. Generally, however, priorities will be dictated by the necessity of protecting existing neighborhoods and other developed areas first. It is expected that the full construction schedule will stretch over a period of twelve (12) years.

Public hearings and presentations concerning this proposed bond issue will be scheduled shortly after completion of the draft EIR early this fall. Specific questions before that time should be directed to Mr. James Melton, Public Information Officer, Santa Clara County Flood Control and Water District, telephone 265-2600.

The views of private citizens and groups are essential to both the completeness of an analysis of social and economic impacts of this proposed project and to the completeness of the project planning effort. We wish to emphasize that the earliest possible expression of community views is in the best interests of both the District and the communities affected. We would, therefore, greatly appreciate it if you would take a few minutes of your time and write down any initial reactions, reservations, or encouragement of yourself or your group, and mail them to East Zone Flood Control, URS Research Company, 155 Bovet Road, San Mateo 94402. Please do so at your earliest convenience so that your views will have the greatest possible impact upon the planning process. Responses must be received by September 1, 1973, in order to be considered in this analysis. It is understood that the initial reaction stated in your response will not necessarily be your final position after complete presentation of project plans has been made and considered.

Thank you for your interest and your help.

Sincerely,

Franklin J. Agardy

Franklin J. Agardy, Ph.D.
Executive Vice President
and Project Director

FJA:nlm
Attachment

Enclosure to Letter

DISTRIBUTION LIST

Mr. Martin M. Seldon, Chairman*
Save Our Peninsula Creeks Committee
1146 Pulora Court
Sunnyvale, California 94087

Ms. Marilyn E. Nyman, President
League of Women Voters
1133 Del Cambre Drive
San Jose, California 95129

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Los Altos, California 94022

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Society of California Archaeologists
1089 Broadway Avenue
San Jose, California 95125

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Santa Clara Valley Audubon Society
23491 Corte Via
Los Altos, California 94022

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*Written response received.

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1176 Emerson
Palo Alto, California 94301

Charles Missar
Ecology Action
2225 El Camino Real
Palo Alto, California 94306

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District Office
4320 Stevens Creek Blvd., Suite 128
San Jose, California 95129

Professor Spenser Havlick*
Department of Environmental Studies
California State University, San Jose
125 South 7th Street
San Jose, California 95112

Mr. Bill Dendy, Executive Officer*
California State Water Resources Control Board
1416 Ninth Street, Room 1015
Sacramento, California 95814

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939 Ellis Street
San Francisco, California 94109

Director of Planning
County of Santa Clara
60 West Hedding
San Jose, California

Mr. John Hamilton*
Office of the City Manager
City of San Jose
801 North First Street
San Jose, California

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City of San Jose
801 North First Street
San Jose, California

California State
Department of Fish and Game*
1416 Ninth Street, 12th Floor
Sacramento, California

Santa Clara County Fish and
  Game Commission
70 West Hedding Street
San Jose, California 95110

San Francisco Bay Regional Water
  Quality Control Board
364 14th Street
Oakland, California 94612

SAVE OUR PENINSULA CREEKS COMMITTEE

P.O. Box 2393 Sunnyvale CA 94087

Please Reply to:

Martin M. Seldon
1146 Pulora Court
Sunnyvale CA 94087

8-20-73

URS Research Company
155 Bovert Road
San Mateo CA 94402

ATTN: Mr. Franklin J. Agardy, Project Director

REF: Your Letter 8-10-73, East Zone Bond Issue

Gentlemen:

I was most concerned over receipt of your letter within the last few days and the deadline for responses of September 1, 1973. On this complex an issue and with almost a complete lack of definitive data accumulated on the specifics of the fishery problem, your request is impossible to fully comply with.

Our organization and the thousands of citizens of this area that are fishermen are most seriously concerned over what seems to be an almost complete neglect of the important fishery values of the South San Francisco Bay Area. We strongly believe that unless specific attention is given to the fishery problems on an indepth basis, that any Project or EIR would violate the provisions of the Federal Fish and Wildlife Coordination Act which the Corps of Engineers is required to comply with. Almost every aspect of these kinds of projects seems to be given attention except for the fishery problem.

We would like to suggest that your study include the services of a competent private fisheries biologist familiar with the area. There are many such people. One we could recommend is : Professor L. J. Hendricks, Dept. of Biological Sciences, San Jose State College, San Jose; Home:1376 Mary Lee Way San Jose 95118,(408) 269-1406.

The area in question still supports runs of wild rainbow steelhead trout an anadromous fish species. In the more remote areas these runs still support small runs of resident trout. Not too many years ago sportsmen in the area regularly took 8 to 10 pound steelhead from Penitencia Creek. These runs still perpetuate as long as good water years correspond to the two to five year biological cycle that characterize these fish. Recently in response to questions regarding the south bay fishery, I had hoped to sponsor an informal survey to define the historical fishery and compare it to what now exists. Again in good water years, sportsmen are still known to find steelhead in downtown San Jose each winter. Unfortunately there just has not been enough time to get this project off the ground.

For your information, I am enclosing a copy of a Sport Fishing Institute reported TVA approach to fishery maintenance in a flood control project. I am also enclosing a letter our group wrote to the Regional Water Quality Board in regard to recent hearings where they also minimized the fishery value of the South Bay Area becuase they were too busy with the engineering aspects of the other areas. We trust that your study will stop and give serious consideration to the specifics of the South Bay Fishery as a completely separate problem area

and that all regulations regarding the environment as they relate to the fishery will be given specific attention.

It is unfortunate that probably little assistance will be available from the Fish and Wildlife Agencies. As you are probably aware the State Department of Fish and Game is funded in California only through the license fees of sportsmen and just doesn't have the available resources to take on such projects. The information just does not seem to be readily available and yet a reasonable study and solutions to the fishery problems must be accomplished before any project of this magnitude could ever be accepted must less meet Federal environmental requirements not to mention the California Fish and Game Code which also provides protection in some regards.

Even a list of all items that must be considered is difficult to set down on such short notice. To list a few:

1. Fish ladders on all drops that would impede fish passage.
2. Preservation, enhancement, restoration & mitigation of:
   - 2.1 The Warm Water Fishery
   - 2.2 The Anadromous Fishery
   - 2.3 The Resident Trout Fishery
3. Coordination with the park/chain of parks plans of the various cities and county agencies to assure that these do not conflict with any of the needs and rights of the fishery.
4. A thorough review of the State and Federal laws requiring preservation, enhancement and restoration , etc. of the fishery.
5. Review of the possible environmental effects of the project on the fishery in the South end of San Francisco Bay itself.
6. Review of the effects of new percolation systems, improved sewerage treatment, etc .,and the potential positive effect on the rehabilitation of the fishery over the next 20 to 50 years.

Your letter sets up an impossible task to evaluate specific features of the project because you provide no information relating to the design details of the project. I would suggest that it is imperative that you generate a project design description brochure that includes such information as definitive bases for even consideration of channelization in each of the reaches of the project.

Your further inquiry is invited.

Sincerely,

Martin M. Seldon

Martin M. Seldon,
Chairman

SIERRA CLUB LOMA PRIETA CHAPTER
FOUNDED IN 1892

232 Hillview Avenue
Los Altos, Ca. 94022
1 September 1973

Dr. Franklin J. Agardy
URS Research Company
155 Bovet Road
San Mateo, California 94402

Dear Dr. Agardy:

EIR, Santa Clara Valley Water District's East Zone Bond Issue

Preparation of the EIR on this Project is a difficult task. Complexities arise not only from the natural interrelationships within our ecosystem but also from the interrelationships of this Project with other issues and projects.

Recognizing the task before you, I wish to offer the Loma Prieta Chapter's cooperation and assistance to the District and to URS. Such an offer is, of course, not purely altruistic. We feel that conservation concerns must be thoroughly addressed, and if we make known those concerns at the outset of the study, we and the general public profit thereby.

I have listed below, according to sections of CEQA Guidelines, essential questions and subject matter that should be given complete answers and thorough evaluation.

1) Project Description

a) What is the need for the Project? How was the need determined? What percentage of the Project is designed to protect lives and property presently existing in the area, and what percentage is designed for future growth (including percentage of cost)?

b) How do the project objectives correspond with the plans of various jurisdictions and agencies, including (but not limited to)

Santa Clara County General Plan (especially the Open Space, Conservation and Housing Elements)
City of San Jose General Plan, as revised (in progress)
Local Agency Formation Commission
Association of Bay Area Governments
San Francisco Bay Regional Water Quality Control Board

U.S. Army Corps of Engineers (A Study of Guadalupe River and Adjacent Streams)
Santa Clara County Transit District
Metropolitan Transportation District
Bay Area Air Pollution Control District
Bay Area Sewer Services Agency
Affected school districts
Santa Clara Valley Water District (vis-a-vis water supply status and program)?

2) <u>Description of Existing Environment</u>

This section should include

a) An inventory of existing land use: population distribution and intensity, agricultural productivity, industrial or other productivity

b) An inventory of flora and fauna, including special recognition of endangered species, if any

c) An inventory of archaeological and historical sites

d) An inventory of atmospheric and earth resources

e) An inventory of water resources, including

A complete description of the total watershed system (surface and subsurface)
Historical flooding data and flood plain maps
Flood control works presently in existence in the area

f) The geological setting

g) Social and economic setting

h) Aesthetic values.

State Guidelines emphasize the discussion of regional as well as local setting; therefore, factors such as that the area lies in a Critical Air Basin must be mentioned.

Maps should be provided to show the boundaries of the East Zone and of the area of benefit (present and future) for the purpose of illustrating who pays and who benefits.

Also, according to the Guidelines (Sec. 15142), related projects are to be covered so that the cumulative impact of adding this project can be assessed. Therefore, such projects as Norwood Creek must be included in this EIR.

3) <u>All of the Environmental Impacts of All Phases of the Project</u>

How will the existing environment as described in (2) above be altered, including

The growth-inducing impact [see (9) below]
Secondary as well as primary effects
Long-term as well as short-term effects
Qualitative as well as quantitative effects?

4) <u>Any Adverse Environmental Effects That Cannot Be Avoided</u>

How do these adverse effects relate to the section on Alternatives [see (6) below]?

5) <u>Mitigation Measures Proposed to Minimize the Impact</u>

This section should include

Alternative mitigation measures
How these measures are to be carried out
Potential adverse impact generated by the mitigation measures
Efficacy of mitigation measures taken on past, similar projects.

6) <u>Alternatives to the Proposed Action</u>

This section must include evaluation of "no project," modifications of the project or portions thereof, other types of projects to meet the same objectives, and other alternatives that would reduce the adverse impact. What are the costs of each alternative?

The same project built over alternative time scales is definitely unacceptable as fulfilling the "Alternatives" requirement under Sec. 15143(d) of CEQA Guidelines.

7) <u>Local Short-Term Uses of Man's Environment vs. Long-Term Productivity</u>

This section should (in addition to covering the cumulative and long-term effects) answer the question of why there is being proposed a bond issue now rather than the normal pay-as-you-go method.

8) <u>Irreversible Environmental Changes</u>

A straightforward directive

9) <u>Growth-Inducing Impact</u>

This section should give more specific and detailed consideration of the growth-inducing impact than in (3) above.

What is the cost to the community of the growth that the project would engender? A thorough economic evaluation should be made of service costs versus tax revenues, in addition to costs of the project itself. Those who benefit should be delineated.

* * * * * * * * * * * * * * *

Thank you for the opportunity to comment. I feel that if these fundamental points are addressed in the initial phase of the study, time and money may be saved. I will be happy to discuss the EIR with you, and I look forward to reviewing the draft Report.

Yours very truly,

Jane O. Baron

Jane O. (Mrs. M.J.) Baron
Chairman, Rivers and Streams
Task Force

cc: B. Goldner, SCVWD

9) Growth-Inducing Impact

This section should give more specific and detailed consideration of the growth-inducing impact than in (3) above.

What is the cost to the community of the growth that the project would engender? A thorough economic evaluation should be made of service costs versus tax revenues, in addition to costs of the project itself. Those who benefit should be delineated.

* * * * * * * * * * * * * * *

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Yours very truly,

Jane O. Baron

Jane O. (Mrs. M.J.) Baron
Chairman, Rivers and Streams
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cc: B. Goldner, SCVWD

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San Jose, California 95114

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1089 Broadway Avenue
San Jose, California 95125

Mr. Gerald R. Grow
Santa Clara Valley Audubon Society
23491 Corte Via
Los Altos, California 94022

---

*Written response received.

DISTRIBUTION LIST (continued)

Peninsula Conservation Center
1176 Emerson
Palo Alto, California 94301

Charles Missar
Ecology Action
2225 El Camino Real
Palo Alto, California 94306

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Palo Alto, California 94301

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San Francisco, California 94108

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San Jose, California 95121

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3090 Quimby Road
San Jose, California 95122

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East San Jose Sun
615 South Main Street
Milpitas, California

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4320 Stevens Creek Blvd., Suite 128
San Jose, California 95129

Professor Spenser Havlick*
Department of Environmental Studies
California State University, San Jose
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San Jose, California 95112

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939 Ellis Street
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Director of Planning
County of Santa Clara
60 West Hedding
San Jose, California

Mr. John Hamilton*
Office of the City Manager
City of San Jose
801 North First Street
San Jose, California

*Written response received.

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City of San Jose
801 North First Street
San Jose, California

California State
Department of Fish and Game*
1416 Ninth Street, 12th Floor
Sacramento, California

Santa Clara County Fish and
  Game Commission
70 West Hedding Street
San Jose, California 95110

San Francisco Bay Regional Water
  Quality Control Board
364 14th Street
Oakland, California 94612

SAVE OUR PENINSULA CREEKS COMMITTEE
P.O. Box 2393 Sunnyvale CA 94087

Please Reply to:

Martin M. Seldon
1146 Pulora Court
Sunnyvale CA 94087

8-20-73

URS Research Company
155 Bovert Road
San Mateo CA 94402

ATTN: Mr. Franklin J. Agardy, Project Director

REF: Your Letter 8-10-73,
East Zone Bond Issue

Gentlemen:

I was most concerned over receipt of your letter within the last few days and the deadline for responses of September 1, 1973. On this complex an issue and with almost a complete lack of definitive data accumulated on the specifics of the fishery problem, your request is impossible to fully comply with.

Our organization and the thousands of citizens of this area that are fishermen are most seriously concerned over what seems to be an almost complete neglect of the important fishery values of the South San Francisco Bay Area. We strongly believe that unless specific attention is given to the fishery problems on an indepth basis, that any Project or EIR would violate the provisions of the Federal Fish and Wildlife Coordination Act which the Corps of Engineers is required to comply with. Almost every aspect of these kinds of projects seems to be given attention except for the fishery problem.

We would like to suggest that your study include the services of a competent private fisheries biologist familiar with the area. There are many such people. One we could recommend is : Professor L. J. Hendricks, Dept. of Biological Sciences, San Jose State College, San Jose; Home:1376 Mary Lee Way San Jose 95118,(408) 269-1406.

The area in question still supports runs of wild rainbow steelhead trout an anadromous fish species. In the more remote areas these runs still support small runs of resident trout. Not too many years ago sportsmen in the area regularly took 8 to 10 pound steelhead from Penitencia Creek. These runs still perpetuate as long as good water years correspond to the two to five year biological cycle that characterize these fish. Recently in response to questions regarding the south bay fishery, I had hoped to sponsor an informal survey to define the historical fishery and compare it to what now exists. Again in good water years, sportsmen are still known to find steelhead in downtown San Jose each winter. Unfortunately there just has not been enough time to get this project off the ground.

For your information, I am enclosing a copy of a Sport Fishing Institute reported TVA approach to fishery maintenance in a flood control project. I am also enclosing a letter our group wrote to the Regional Water Quality Board in regard to recent hearings where they also minimized the fishery value of the South Bay Area becuase they were too busy with the engineering aspects of the other areas. We trust that your study will stop and give serious consideration to the specifics of the South Bay Fishery as a completely separate problem area

and that all regulations regarding the environment as they relate to the fishery will be given specific attention.

It is unfortunate that probably little assistance will be available from the Fish and Wildlife Agencies. As you are probably aware the State Department of Fish and Game is funded in California only through the license fees of sportsmen and just doesn't have the available resources to take on such projects. The information just does not seem to be readily available and yet a reasonable study and solutions to the fishery problems must be accomplished before any project of this magnitude could ever be accepted must less meet Federal environmental requirements not to mention the California Fish and Game Code which also provides protection in some regards.

Even a list of all items that must be considered is difficult to set down on such short notice. To list a few:

1. Fish ladders on all drops that would impede fish passage.
2. Preservation, enhancement, restoration & mitigation of:
   - 2.1 The Warm Water Fishery
   - 2.2 The Anadromous Fishery
   - 2.3 The Resident Trout Fishery
3. Coordination with the park/chain of parks plans of the various cities and county agencies to assure that these do not conflict with any of the needs and rights of the fishery.

4. A thorough review of the State and Federal laws requiring preservation, enhancement and restoration , etc. of the fishery.

5. Review of the possible environmental effects of the project on the fishery in the South end of San Francisco Bay itself.

6. Review of the effects of new percolation systems, improved sewerage treatment, etc ., and the potential positive effect on the rehabilitation of the fishery over the next 20 to 50 years.

Your letter sets up an impossible task to evaluate specific features of the project because you provide no information relating to the design details of the project. I would suggest that it is imperative that you generate a project design description brochure that includes such information as definitive bases for even consideration of channelization in each of the reaches of the project.

Your further inquiry is invited.

Sincerely,

Martin M. Seldon

Martin M. Seldon,
Chairman

SIERRA CLUB LOMA PRIETA CHAPTER

FOUNDED IN 1892

232 Hillview Avenue
Los Altos, Ca. 94022
1 September 1973

Dr. Franklin J. Agardy
URS Research Company
155 Bovet Road
San Mateo, California 94402

Dear Dr. Agardy:

EIR, Santa Clara Valley Water District's East Zone Bond Issue

Preparation of the EIR on this Project is a difficult task. Complexities arise not only from the natural interrelationships within our ecosystem but also from the interrelationships of this Project with other issues and projects.

Recognizing the task before you, I wish to offer the Loma Prieta Chapter's cooperation and assistance to the District and to URS. Such an offer is, of course, not purely altruistic. We feel that conservation concerns must be thoroughly addressed, and if we make known those concerns at the outset of the study, we and the general public profit thereby.

I have listed below, according to sections of CEQA Guidelines, essential questions and subject matter that should be given complete answers and thorough evaluation.

1) Project Description

a) What is the need for the Project? How was the need determined? What percentage of the Project is designed to protect lives and property presently existing in the area, and what percentage is designed for future growth (including percentage of cost)?

b) How do the project objectives correspond with the plans of various jurisdictions and agencies, including (but not limited to)

Santa Clara County General Plan (especially the Open Space, Conservation and Housing Elements)
City of San Jose General Plan, as revised (in progress)
Local Agency Formation Commission
Association of Bay Area Governments
San Francisco Bay Regional Water Quality Control Board

U.S. Army Corps of Engineers (A Study of Guadalupe River and Adjacent Streams)
Santa Clara County Transit District
Metropolitan Transportation District
Bay Area Air Pollution Control District
Bay Area Sewer Services Agency
Affected school districts
Santa Clara Valley Water District (vis-a-vis water supply status and program)?

2) <u>Description of Existing Environment</u>

This section should include

a) An inventory of existing land use: population distribution and intensity, agricultural productivity, industrial or other productivity

b) An inventory of flora and fauna, including special recognition of endangered species, if any

c) An inventory of archaeological and historical sites

d) An inventory of atmospheric and earth resources

e) An inventory of water resources, including

A complete description of the total watershed system (surface and subsurface)
Historical flooding data and flood plain maps
Flood control works presently in existence in the area

f) The geological setting

g) Social and economic setting

h) Aesthetic values.

State Guidelines emphasize the discussion of regional as well as local setting; therefore, factors such as that the area lies in a Critical Air Basin must be mentioned.

Maps should be provided to show the boundaries of the East Zone and of the area of benefit (present and future) for the purpose of illustrating who pays and who benefits.

Also, according to the Guidelines (Sec. 15142), related projects are to be covered so that the cumulative impact of adding this project can be assessed. Therefore, such projects as Norwood Creek must be included in this EIR.

3) <u>All of the Environmental Impacts of All Phases of the Project</u>

How will the existing environment as described in (2) above be altered, including

The growth-inducing impact [see (9) below]
Secondary as well as primary effects
Long-term as well as short-term effects
Qualitative as well as quantitative effects?

4) <u>Any Adverse Environmental Effects That Cannot Be Avoided</u>

How do these adverse effects relate to the section on Alternatives [see (6) below]?

5) <u>Mitigation Measures Proposed to Minimize the Impact</u>

This section should include

Alternative mitigation measures
How these measures are to be carried out
Potential adverse impact generated by the mitigation measures
Efficacy of mitigation measures taken on past, similar projects.

6) <u>Alternatives to the Proposed Action</u>

This section must include evaluation of "no project," modifications of the project or portions thereof, other types of projects to meet the same objectives, and other alternatives that would reduce the adverse impact. What are the costs of each alternative?

The same project built over alternative time scales is definitely unacceptable as fulfilling the "Alternatives" requirement under Sec. 15143(d) of CEQA Guidelines.

7) <u>Local Short-Term Uses of Man's Environment vs. Long-Term Productivity</u>

This section should (in addition to covering the cumulative and long-term effects) answer the question of why there is being proposed a bond issue now rather than the normal pay-as-you-go method.

8) <u>Irreversible Environmental Changes</u>

A straightforward directive

9) Growth-Inducing Impact

This section should give more specific and detailed consideration of the growth-inducing impact than in (3) above.

What is the cost to the community of the growth that the project would engender? A thorough economic evaluation should be made of service costs versus tax revenues, in addition to costs of the project itself. Those who benefit should be delineated.

* * * * * * * * * * * * * * *

Thank you for the opportunity to comment. I feel that if these fundamental points are addressed in the initial phase of the study, time and money may be saved. I will be happy to discuss the EIR with you, and I look forward to reviewing the draft Report.

Yours very truly,

Jane O. Baron

Jane O. (Mrs. M.J.) Baron
Chairman, Rivers and Streams
Task Force

cc: B. Goldner, SCVWD

August 28, 1973

URS Research Company
155 Bovet Road
San Mateo, Ca. 94402

Attention Franklin J. Agardy, Ph.D.

Gentlemen:

I am writing in regard to the Santa Clara County Flood Control and Water District's proposed improvements on flood control channels in the east zone. As you are aware, the channel improvements in Milpitas are of particular concern to the Milpitas Beautification Committee. The Committee has been working closely with the Flood Control District for the past several years and has developed a very close working relationship with them. The District, with support from the Committee, has begun the landscaping of various channels in the Milpitas area and has also assisted in our annual community clean-up projects. The Committee is aware of the District's annual channel maintenance program and has seen much improvement over the past few years.

The Committee fully supports the proposed flood control improvements. We are very pleased to know that the District plans include landscaping as a part of the improvements on these channels. The MBC realizes the impact on growth that these improvements will produce. These improvements will increase the potential for development in many areas of our community. The improvements on Berryessa Channel will insure the development of our Town Center, a project of top priority and of substantial economic impact to our community. In essence, there will be numerous benefits to the Milpitas community derived from these improvements.

The MBC realizes that the District will be educating the residents as much as possible in the ensuing months to achieve a successful bond campaign. The MBC will certainly assist the District in this educational process and we fully support the needed channel improvements.

Very truly yours,

Fred Turnier

Fred Turnier
Secretary

FT/mm

MILPITAS BEAUTIFICATION COMMITTEE 455 E. CALAVERAS BOULEVARD
MILPITAS, CALIFORNIA 95035

Route 3, Box 447
San Jose, California 95121
August 27, 1973

Dr. Franklin J. Agardy
URS Research Company
155 Bovet Road
San Mateo, California 94402

RE: Santa Clara County Flood Control and Water District's East Zone Bond Issue for Flood Control Improvements

Dear Dr. Agardy:

In response to your letter of August 10, 1973, I have the following comments to make. These remarks are by no means my total arguments against the project as very little background information on the proposed project was provided in your letter.

1. I feel that the spending of public funds should be limited to those areas which are presently inhabited and are in flood danger on a continuing basis. I would work hard to help pass such a bond issue. I would work equally as hard to defeat a bond issue that would allow the Santa Clara County Flood Control and Water District to hasten the development of housing tracts in areas with prime agricultural soils and valuable open space so that private land speculators might profit. Improvement of street channels in uninhabited space would not appear to be a wise use of public funds and would negatively affect the quality of life for all East Zone residents.

2. As of this writing I have been unable to find any evidence that would support Santa Clara County Flood Control and Water District's claims regarding the one hundred year flood. As you know, this county has been inhabited for over one hundred years. The camera has been in use for over one hundred years. I would think that photographic evidence of terrible flooding in Santa Clara county exists as a public record, that is, if severe flooding did occur. The famous photographer Andrew P. Hill resided in Santa Clara county and captured on film its people and their daily experiences. It does not appear that he took one picture of a flood in this county. Therefore, I would like to challenge the Santa Clara County Flood Control and Water District's figures regarding the one hundred year flood. Since the entire East Zone matter hinges on these flooding figures, I think that it is most important that the figures be checked and double checked.

3. Our county is fast approaching a water crisis. Mr. Lloyd Fowler, the Chief Engineer for the Santa Clara County Flood Control District, has predicted publicly that the county will have serious water problems by the year 1977 if it does not seek other water sources. The proposed San Felipe Water Project is designed to relieve Santa Clara county's water needs. Opponents and proponents for the San Felipe Project have warned that before the project can be approved, the District will have to prove that they have exhausted every possible source of water. The District is presently involved in a water reclamation project for this reason. In view of the above information, I do not see how it is possible for the Santa Clara County Flood Control and Water District to come to the voters in the East Zone with a project that will hurry the water of the Santa Clara valley into the bay even faster than it goes in now. The installation of any concrete or rock lined channels will seriously inhibit ground water percolation in an area where subsidence is already a problem and where ground water levels decrease yearly. The District should make adequate provisions for the percolation of water back into ground water reserves before it goes ahead with this East Zone project. I would also like to see the Santa Clara County Flood Control District designing the kind of channels that would encourage creek waters to be absorbed back into the soil rather than hastening the flow of water into the bay where its reclamation is both difficult and expensive.

In conclusion, I would oppose the proposed project and the bond issue that would finance it on the following grounds: (1) the project would improve channels in uninhabited areas to the benefit of no one but land speculators and to the detriment of the environment; (2) the one hundred year flood premise held by the Santa Clara County Flood Control District is very arbitrary and ambiguous and without solid scientific data to support it; and (3) the proposed improvements will seriously affect ground water quality and quantity in a county that receives a large portion of its water from the ground and will hasten the depletion of ground water resources which would ultimately result in expensive water importation projects.

Very truly yours,

John L. Hellyer

JLH:ph

August 28, 1973

Franklin J. Agardy, Ph.D.
Executive Vice President
U.R S Research Company
155 Bovet Road
San Mateo, Ca. 94402

Dear Sir;

This is in reference to your letter of August 10, 1973, regarding the Santa Clara County Flood Control and Water District proposal for a bond issue in the East Zone. Following are some of my concerns, questions and comments.

(1) Are not some improvements proposed on creeks which are outside of the City of San Joses' Urban Zone? If so, would this not tend to induce premature growth in these areas?

(2) How much will the total improvements cost? How much, including total cost of bond election, retirement of bonds, etc? How much will this be per $100 assessed property valuation?

(3) Is it true that what the District proposes in the way of improvements is not neccessarily what will be constructed?

(4) Is it possible for the District to use bond election funds to construct & improve projects not specifically mentioned in the proposal? Can money for bond issue in the East Zone be used in other Zones? Please comment.

(5) Much of the proposal concerns itself with improvements in upper creek reaches, as in the Evergreen District, which seem to serve mainly to accelerate growth in these areas. Would not the taxpayers be paying for faster growth?

(6) Much of the preliminary plans that I have seen call for concrete channels, pipes, and the like, especially in the Evergreen area. The gaining of these traditionally ugly harsh structures and other estheticly undesireable features is offset by the loss of wildlife, natural life forms and other fast disapearing assets of a friendly, bucolic environment. Also lost are ground recharge features of a flood plains concept. The District has made a great deal of commotion in Palo Alto--and in the south County in the summer of 1972--about preserving the ground recharge system, about salt water

incursion, and about land subsidence. Are not most, if not all, of these excellent features of a flood plains concept being sacrificed to serve the developers' needs in our area? Please comment on all of the above, if possible.

(7)The commonest argument that is advanced by the developers and land promoters in favor of this bond election seems to run thus, quote," The people in the lower flood reaches are in danger of being flooded each year. Their health, safety and property are in jeopardy. It is our moral obligation to pass this bond issue to provide for rapid improvement in these areas. Also we are asking for improvements in the upper reaches, which will incidentally allow accelerated growth. This last is a small price for the taxpayer to pay for flood safety". Unquote. But the average taxpayer is not in a receptive mood. Food prices go up daily. There is a fuel crises, a power crises. Taxes are increasing. The chances of citizens passing this bond issue while knowing full well that it is designed almost exclusively to serve developers, are nil. Isn't the District in effect gambling with the health and safety of people in the lower flood areas by not proposing a program that deals solely with the real problems? Would not a smaller bond issue have a better chance to pass. It seems to be a waste of taxpayers money to propose such a program as you have.

I will be able to offer additional input as more information regarding the District proposal becomes available. So far, as you know, details and specifics are meager.

Respectfully,

Virginia A. Bolling

Virginia A. Bolling
3090 Quimby Road
San Jose, Ca. 95122

DISTRICT OFFICE
4320 STEVENS CREEK BLVD.
SUITE 128
SAN JOSE, CA 95129
(408) 241-6900

CAPITOL OFFICE
ROOM 5150
STATE CAPITOL
SACRAMENTO 95814
TEL.: AREA CODE 916
445-4253

Assembly
California Legislature

JOHN VASCONCELLOS
ASSEMBLYMAN, TWENTY-FOURTH DISTRICT

COMMITTEES
Education
Constitutional Amendments
Ways and Means

September 7, 1973

Dear Frank:

Thanks for including me as a "concerned citizen." I'm sorry I wasn't able to get a response to you before September 1st.

I feel that if the priorities are, in fact, "dictated by the necessity of protecting existing neighborhoods and other developed areas first", and both physical and socioeconomic impact are carefully considered the interests of the people of Santa Clara County will be served.

I would like to be notified of the hearings as they are set, so that I might attend.

Meantime....

Strength and peace,

K Davidson

Kay Davidson
District Office Representative

California State University, San José
SAN JOSE, CALIFORNIA 95192

DEPARTMENT OF ENVIRONMENTAL STUDIES (408) 277-2940

August 29, 1973

Dr. Frank Agardy
Project Director of East Zone Flood Control
URS Research Company
155 Bovet Road
San Mateo, California 94402

Dear Frank,

Your thoughtful letter came today and I am pleased in the interest you and the Flood Control District are showing in the proposed undertakings.

I have four immediate reactions which I trust you will respond to very soon:

1. No specific information was included in your August 28 form letter to permit a thoughtful response or reaction as you requested. So without any specific idea of the general priorities I have a negative reaction. Is this P.R. or do you really want informed public involvement?

2. Please send timetable of all public hearings and presentations to me.

3. Please send a copy of the draft EIR as soon as possible and hopefully well before any public hearings.

4. What is the District's East Zone doing?

In brief I am supportive of your effort, but you didn't send anything for me to comment on.

Cordially,

Spenser W. Havlick

Spenser W. Havlick

SWH;sh

STATE OF CALIFORNIA—THE RESOURCES AGENCY RONALD REAGAN, Governor

STATE WATER RESOURCES CONTROL BOARD
ROOM 1015, RESOURCES BUILDING
1416 NINTH STREET • SACRAMENTO 95814

SEP 7 1973

Dr. Franklin J. Agardy
Executive Vice President and
Project Director
URS Research Company
155 Bovet Road
San Mateo, CA 94402

Dear Dr. Agardy:

Your letter of August 10, 1973, requested our initial reaction to a proposal by the Santa Clara County Flood Control and Water District to finance the construction of flood control improvements on 18 stream channels in the District's East Zone.

Our reaction to the proposal will depend on the type of projects on individual streams and methods of construction used. Usually we are concerned about projects which may significantly shorten stream sections and cause erosion due to increased velocities and the continuing tendency of the stream to meander against unprotected banks in new sections downstream from natural sections. We are also concerned about projects that will expose the low flow of a stream on a wide, flat expanse of lined channel and cause increases in temperature of the water. Short-term impacts of construction are regulated by the California Regional Water Quality Control Board, San Francisco Bay Region, so they should be contacted prior to requesting contract proposals.

Your environmental impact report should contain information on the flow regimen of each stream, existing water quality, relationship to groundwater and recharge areas, and uses of water in the streambed. Instream uses of water should include consideration of the stream environment and the possible impact of projects on that environment.

Sincerely,

Peter A. Rogers

For Bill B. Dendy
Executive Officer

cc: Regional Board 2

RECYCLED PAPER

CITY OF SAN JOSE
CALIFORNIA

CITY MANAGER

801 N. FIRST ST.
SAN JOSE, CA 95110
TELEPHONE (408) 277-4000

August 27, 1973

East Zone Flood Control
URS Research Company
155 Bovet Road
San Mateo, California 94442

Gentlemen:

I am pleased to see the Santa Clara County Flood Control and Water District is taking such a positive step to provide financing for the much needed flood control channels in the East Zone. The lack of adequate channel improvements poses a constant flood threat to developed areas within a zone.

I certainly agree with the concept expressed in your letter that priorities would be dictated by the necessity of protecting existing neighborhoods and other developed areas first. The City of San Jose has long supported the philosophy that the Flood Control District make every effort to protect existing developments from flooding prior to constructing channels for new developments.

Sincerely,

by J. W. Hamilton
Deputy

Ted Tedesco
City Manager

STATE OF CALIFORNIA—RESOURCES AGENCY RONALD REAGAN, *Governor*

DEPARTMENT OF FISH AND GAME

Post Office Box 47
Yountville, California 94599

August 29, 1973

Dr. Franklin Agardy
Executive Vice-President
URS Research Company
155 Bovet Road
San Mateo, California 94402

Dear Doctor Agardy:

Thank you for inviting our preliminary comments concerning the Santa Clara County Flood Control and Water District's East Zone Project for which you are preparing an Environmental Impact Report.

The proposed construction of flood control improvements on eighteen streams in the Coyote Creek drainage could have a detrimental impact on fish and wildlife habitat and resources. We are particularly concerned about the possible loss of available riparian wildlife habitat. Also, consideration should be given to project features that will provide for the mitigation and restoration of fish and wildlife resources.

It is difficult to provide detailed comments on the proposed project in the absence of a description of the flood control improvements being considered and specific stream resources involved. Although our resource inventory information on the drainage is minimal, this material is available to you. District Biologists will be available to meet with your staff to discuss the resources involved and our concern with the project.

If a meeting is desired, please contact Mr. Bruce Elliott, Wildlife Biologist, 485 Manzanita Way, Felton, California 95018, concerning wildlife values and Mr. Wallace Strohschein, Fishery Biologist, 411 Burgess Drive, Menlo Park, California 94025, regarding fisheries. Their telephone numbers are (408) 335-7541 and (415) 326-0324, respectively.

Sincerely,

J. C. Fraser
Regional Manager
Region 3

cc: Mr. Bruce Elliott
Mr. Wallace Strohschein

7335

LIST OF EXHIBITS
FOR ENVIRONMENTAL IMPACT REPORT ON THE
SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT
EAST FLOOD CONTROL ZONE PROJECT

Scale: 1"=8000'

1. Coyote Creek
2. Fisher Creek
3. Silver Creek - Upper
4. Silver Creek - Lower
5. Thompson Creek
6. Cribari Creek
7. Yerba Buena Creek
8. Evergreen Creek
9. Fowler Creek
10. Quimby Creek
11. Norwood Creek
12. Ruby Creek
13. Flint Creek
14. South Babb Creek
15. North Babb Creek
16. Miguelita Creek
17. Upper Penitencia Creek
18. Sierra Creek
19. Berryessa Creek
20. Penitencia East Channel
21. Lower Penitencia Creek
22. Piedmont Creek
23. Los Coches Creek
24. Tularcitos Creek
25. Calera Creek
26. Scott Creek

LEGEND

HISTORICAL FLOODING

ONE PERCENT (100 YEAR) FLOOD

EAST ZONE BOUNDARY

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

EAST ZONE

FLOODING MAP

DATE: DEC. 1973

EXHIBIT A

Scale: 1"=8000'

LEGEND

MODIFIED FLOOD PLAIN	
NATURAL CHANNEL	
EARTH CHANNEL	
ROCK OR BAGION LINED CHANNEL	
CONCRETE CHANNEL	
PIPE OR CONCRETE BOX	
MODIFIED FLOOD PLAIN WITH EXCAVATED CHANNEL (ADJACENT TO NATURAL CHANNEL)	
EAST ZONE BOUNDARY	

1. Coyote Creek
2. Fisher Creek
3. Silver Creek - Lower
4. Thompson Creek
5. Yerba Buena Creek
6. Evergreen Creek
7. Fowler Creek
8. Quimby Creek
9. Ruby Creek
10. Flint Creek
11. South Babb Creek
12. North Babb Creek
13. Upper Penitencia Creek
14. Berryessa Creek
15. Los Coches Creek
16. Calera Creek
17. Lower Penitencia Creek
18. Penitencia East Channel

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

EAST ZONE

PROPOSED FLOOD CONTROL IMPROVEMENTS

DATE: DEC. 1973 EXHIBIT B

Contact
(Dashed where approximately located, gradational or inferred)

Fault
(Dashed where approximately located; dotted where concealed)

Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

CONTOUR INTERVAL 200 FEET

TRANSVERSE MERCATOR PROJECTION

CENOZOIC

QUATERNARY

Recent

Qal	Alluvium
Qsc	Stream channel deposits (GREAT VALLEY)
Qf	Fan deposits (GREAT VALLEY)
Qb	Basin deposits (GREAT VALLEY)
Qst	Salt deposits

Pleistocene

QP	Plio-Pleistocene nonmarine

Pliocene

Pmlc	Middle and/or lower Pliocene nonmarine

TERTIARY

Miocene

Mu	Upper Miocene marine
Mm	Middle Miocene marine
Ml	Lower Miocene marine

Undivided

Tc	Tertiary nonmarine

Ti	Tertiary intrusive (hypabyssal) rocks: Ti[r] -rhyolite; Ti[a] -andesite; Ti[b] -basalt
Tv	Tertiary volcanic: Tv[r] —rhyolite; Tv[a] —andesite; Tv[b] —basalt; Tv[p] —pyroclastic rocks

MESOZOIC

CRETACEOUS

Ku	Upper Cretaceous marine
Kl	Lower Cretaceous marine

JURASSIC

Jk	Knoxville Formation
Ju	Upper Jurassic marine

KJf — Franciscan Formation

KJfv	Franciscan volcanic and metavolcanic rocks
gr	Mesozoic granitic rocks: gr[a] -granite and adamellite; gr[g] -granodiorite; gr[t] -tonalite and diorite
bi	Mesozoic basic intrusive rocks
ub	Mesozoic ultrabasic intrusive rocks

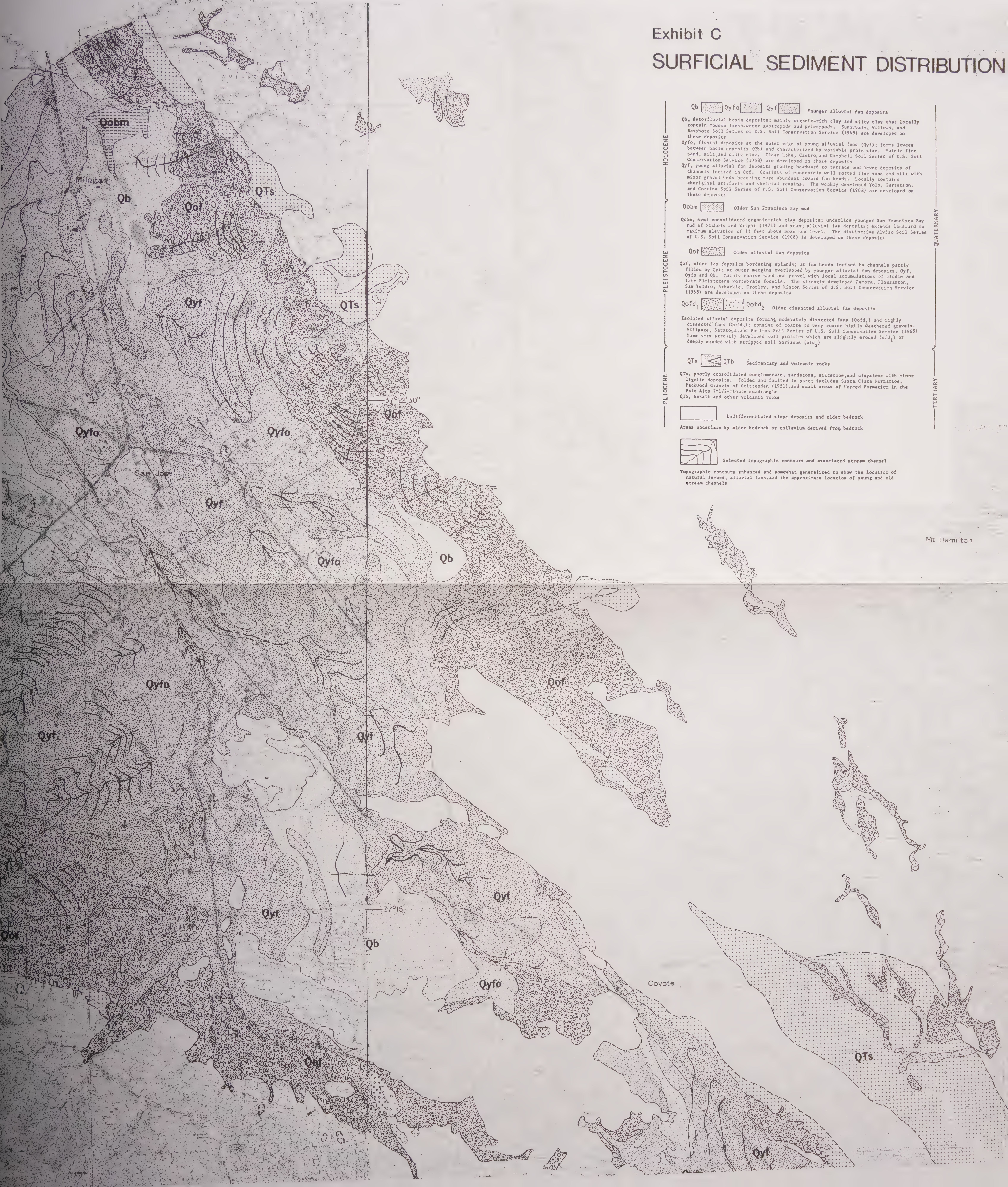
EXHIBIT D

GEOLOGIC MAP OF EASTERN SANTA CLARA COUNTY

Source: Reference 10

Exhibit C

SURFICIAL SEDIMENT DISTRIBUTION



HOLOCENE — PLEISTOCENE — PLIOCENE; QUATERNARY — TERTIARY

Qb | Qyfo | Qyf — Younger alluvial fan deposits

Qb, interfluvial basin deposits; mainly organic-rich clay and silty clay that locally contain modern fresh-water gastropods and pelecypods. Sunnyvale, Willows, and Bayshore Soil Series of U.S. Soil Conservation Service (1968) are developed on these deposits

Qyfo, fluvial deposits at the outer edge of young alluvial fans (Qyf); forms levees between basin deposits (Qb) and characterized by variable grain size. Mainly fine sand, silt, and silty clay. Clear Lake, Castro, and Campbell Soil Series of U.S. Soil Conservation Service (1968) are developed on these deposits

Qyf, young alluvial fan deposits grading headward to terrace and levee deposits of channels incised in Qof. Consists of moderately well sorted fine sand and silt with minor gravel beds becoming more abundant toward fan heads. Locally contains aboriginal artifacts and skeletal remains. The weakly developed Yolo, Garretson, and Cortina Soil Series of U.S. Soil Conservation Service (1968) are developed on these deposits

Qobm — Older San Francisco Bay mud

Qobm, semi consolidated organic-rich clay deposits; underlies younger San Francisco Bay mud of Nichols and Wright (1971) and young alluvial fan deposits; extends landward to maximum elevation of 10 feet above mean sea level. The distinctive Alviso Soil Series of U.S. Soil Conservation Service (1968) is developed on these deposits

Qof — Older alluvial fan deposits

Qof, older fan deposits bordering uplands; at fan heads incised by channels partly filled by Qyf; at outer margins overlapped by younger alluvial fan deposits, Qyf, Qyfo and Qb. Mainly coarse sand and gravel with local accumulations of middle and late Pleistocene vertebrate fossils. The strongly developed Zamora, Pleasanton, San Ysidro, Arbuckle, Cropley, and Rincon Series of U.S. Soil Conservation Service (1968) are developed on these deposits

$Qofd_1$ | $Qofd_2$ — Older dissected alluvial fan deposits

Isolated alluvial deposits forming moderately dissected fans ($Qofd_1$) and highly dissected fans ($Qofd_2$); consist of coarse to very coarse highly weathered gravels. Hillgate, Saratoga, and Positas Soil Series of U.S. Soil Conservation Service (1968) have very strongly developed soil profiles which are slightly eroded (ofd_1) or deeply eroded with stripped soil horizons (ofd_2)

QTs | QTb — Sedimentary and volcanic rocks

QTs, poorly consolidated conglomerate, sandstone, siltstone, and claystone with minor lignite deposits. Folded and faulted in part; includes Santa Clara Formation, Packwood Gravels of Crittenden (1951), and small areas of Merced Formation in the Palo Alto 7-1/2-minute quadrangle

QTb, basalt and other volcanic rocks

Undifferentiated slope deposits and older bedrock

Areas underlain by older bedrock or colluvium derived from bedrock

Selected topographic contours and associated stream channel

Topographic contours enhanced and somewhat generalized to show the location of natural levees, alluvial fans, and the approximate location of young and old stream channels

EXHIBIT E

SPHERES OF INFLUENCE AND INCORPORATED AREAS IN THE EAST ZONE

INCORPORATED AREAS

AREAS OF INFLUENCE

EAST ZONE BOUNDARY

EXHIBIT F

URBAN SERVICE AREAS IN THE EAST ZONE

FULL SERVICE AREAS

EAST ZONE BOUNDARY

EXHIBIT G

DEVELOPED AND UNDEVELOPED EAST ZONE AREAS

LAND USE

EAST ZONE BOUNDARY

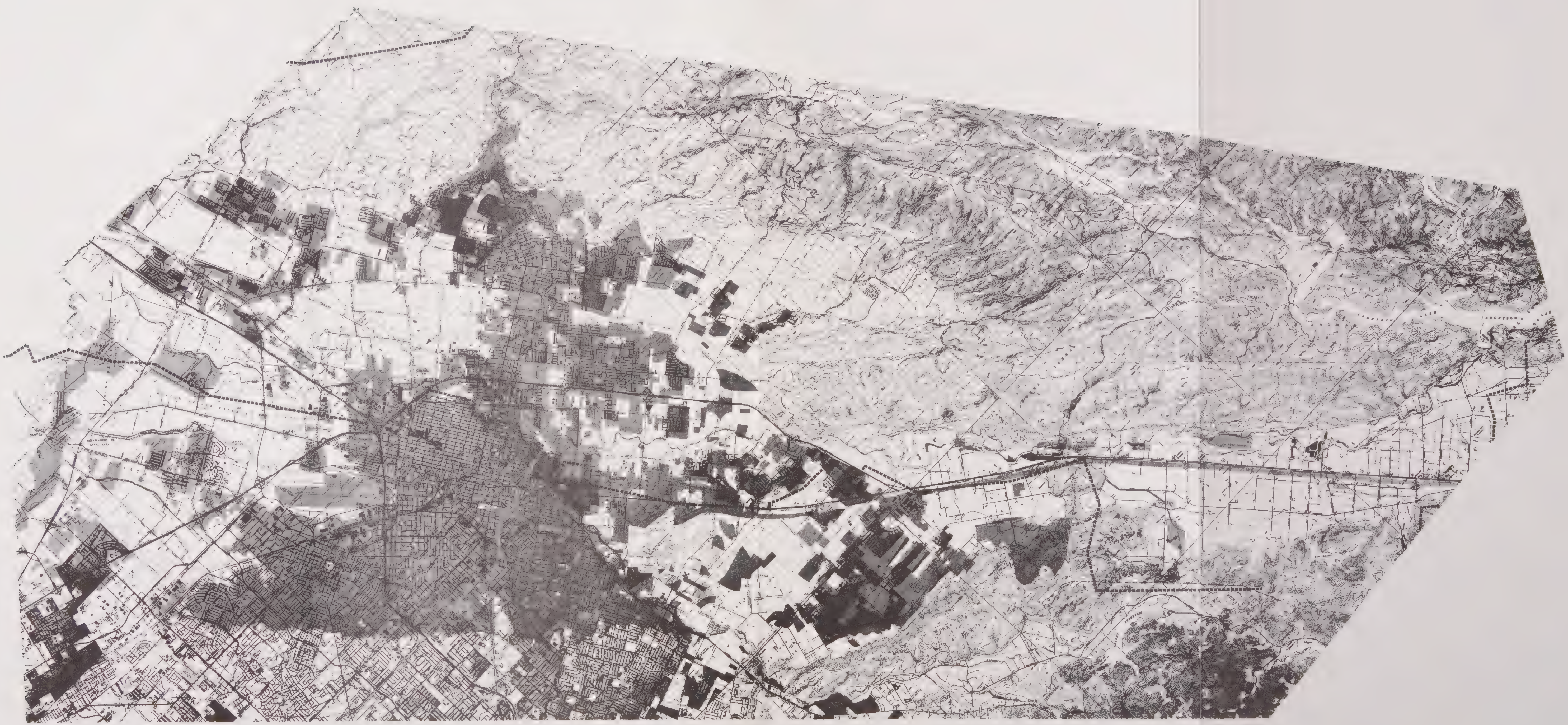


EXHIBIT H

DEVELOPED, UNDEVELOPABLE, AND UNDEVELOPED PORTIONS OF EAST ZONE URBAN SERVICE AREAS

LAND USE

FULL SERVICE AREAS

EAST ZONE BOUNDARY

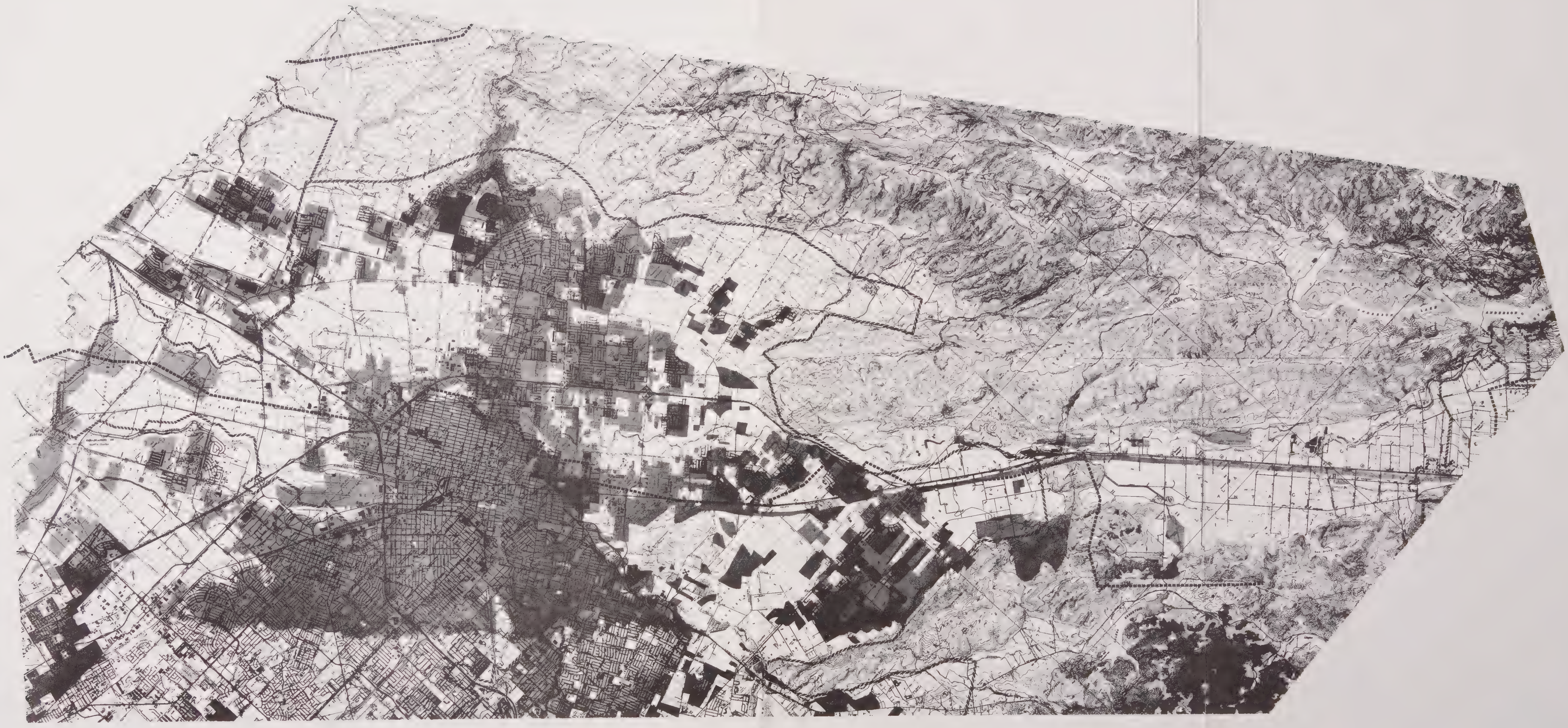


EXHIBIT I

EAST ZONE LANDS POTENTIALLY RESTRICTED FROM DEVELOPMENT BY PROPOSED CITY SERVICES COMBINING ZONE

▭	LAND USE
▬ ▬ ▬	FULL SERVICE AREAS
▥	INCORPORATED AREAS
• • • •	AREAS OF INFLUENCE
▬ ▬ ▬	EAST ZONE BOUNDARY

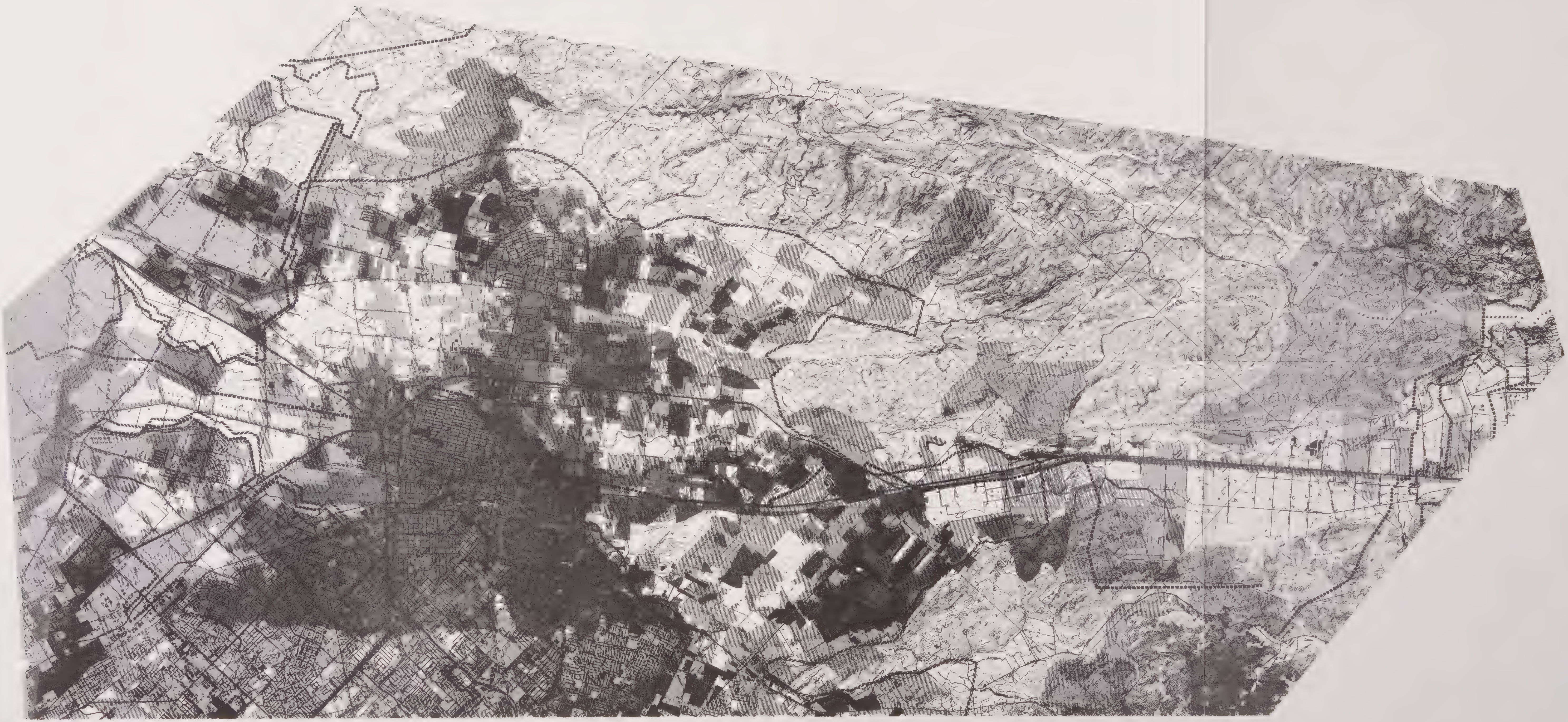


Exhibit J
OPEN SPACE
ELEMENT
THE
GENERAL PLAN
SAN JOSE, CALIFORNIA
AS AMENDED - APRIL, 1973
OPEN SPACE PLAN MAP
LEGEND
EAST ZONE BOUNDARY
PARKS - Existing
PRIVATE OPEN SPACE
PARKS - Possible Sites
4 0 4 8 12
SCALE IN THOUSANDS OF FEET
N
*THESE ITEMS ALONG WITH STREETS AND OTHER CIRCULATION FACILITIES ARE IDENTIFIED AND LOCATED FOR PRESENTATION PURPOSES ONLY
2D26


Exhibit K
THE
GENERAL PLAN
1966-2010
San Jose, California
AS AMENDED — 1971
LEGEND
PARKS AND OPEN SPACE
EAST ZONE BOUNDARY
CIRCULATION
FREEWAY
EXPRESSWAY
6 LANE MAJOR STREET
4 LANE MAJOR STREET
RAPID TRANSIT
SEPARATION
INTERCHANGE
CENTRAL AREA TRAFFIC SYSTEM
SANTA TERESA

Exhibit L

A PLAN FOR REGIONAL PARKS, SANTA CLARA COUNTY


EXHIBIT M
FLOODABLE AREAS BY CREEK
CREEK FLOODABLE AREA
LOWER PENITENCIA
CALERA
BERRYESSA CREEK
LOS COCHES
COYOTE - Trimble to Bay
COYOTE - Trimble Road to Silver Creek
UPPER PENITENCIA CREEK
NORTH BABB
SOUTH BABB
FLINT
RUBY
SILVER CREEK
THOMPSON
QUIMBY
FOWLER
EVERGREEN
COYOTE - Silver Creek to U.S. 101
COYOTE - U.S. 101 South to Metcalf
FISHER
COYOTE - Dam to Metcalf


EAST ZONE BOUNDARY
EXHIBIT N
HIGHWAY NETWORK IN THE PROJECT AREA
Existing Freeways
Proposed or Planned Freeways

EXHIBIT O

RAILROADS AND AIRPORTS IN THE PROJECT AREA

EXHIBIT P

UTILITIES PIPELINES IN THE PROJECT AREA

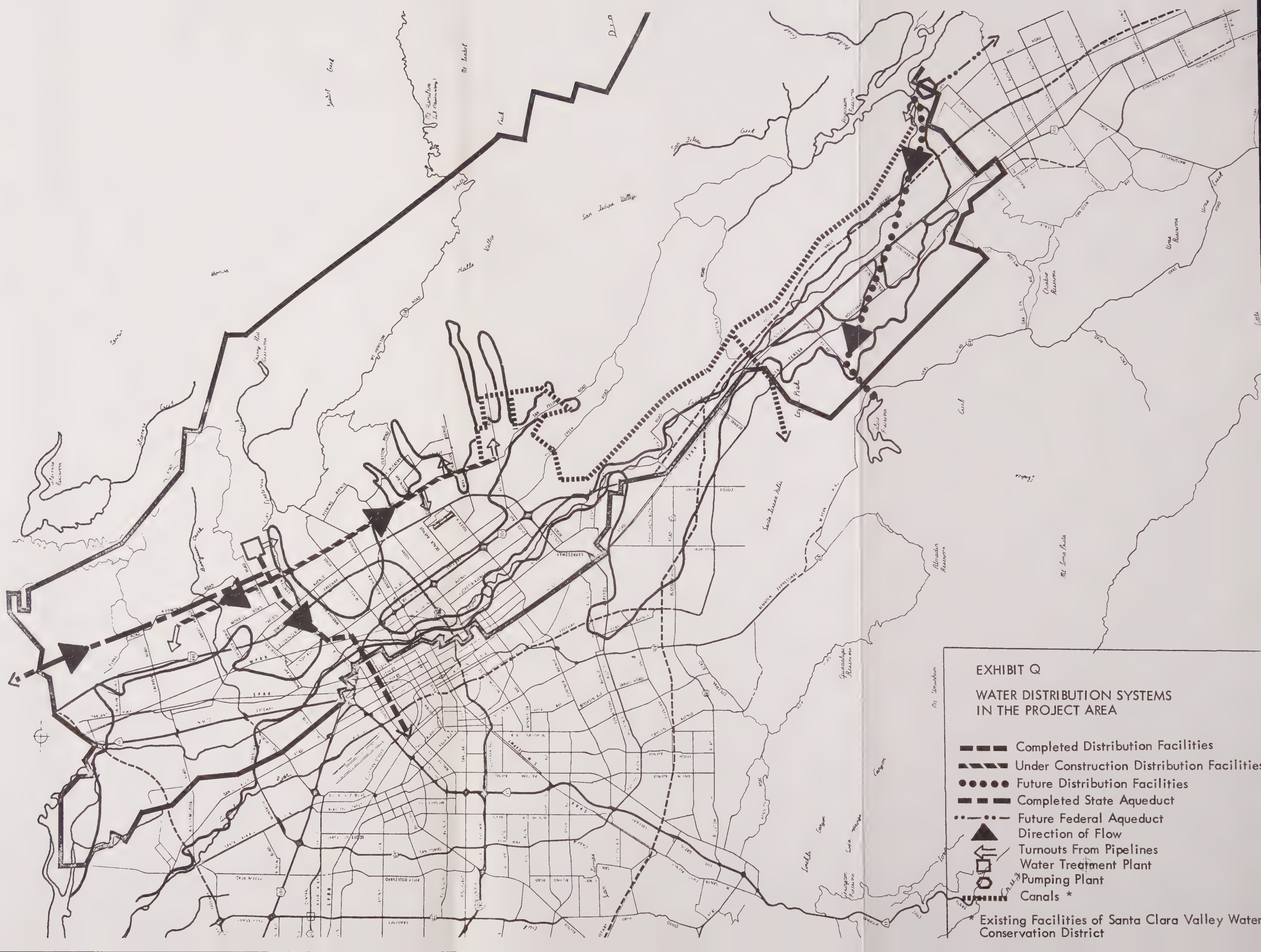


EXHIBIT Q

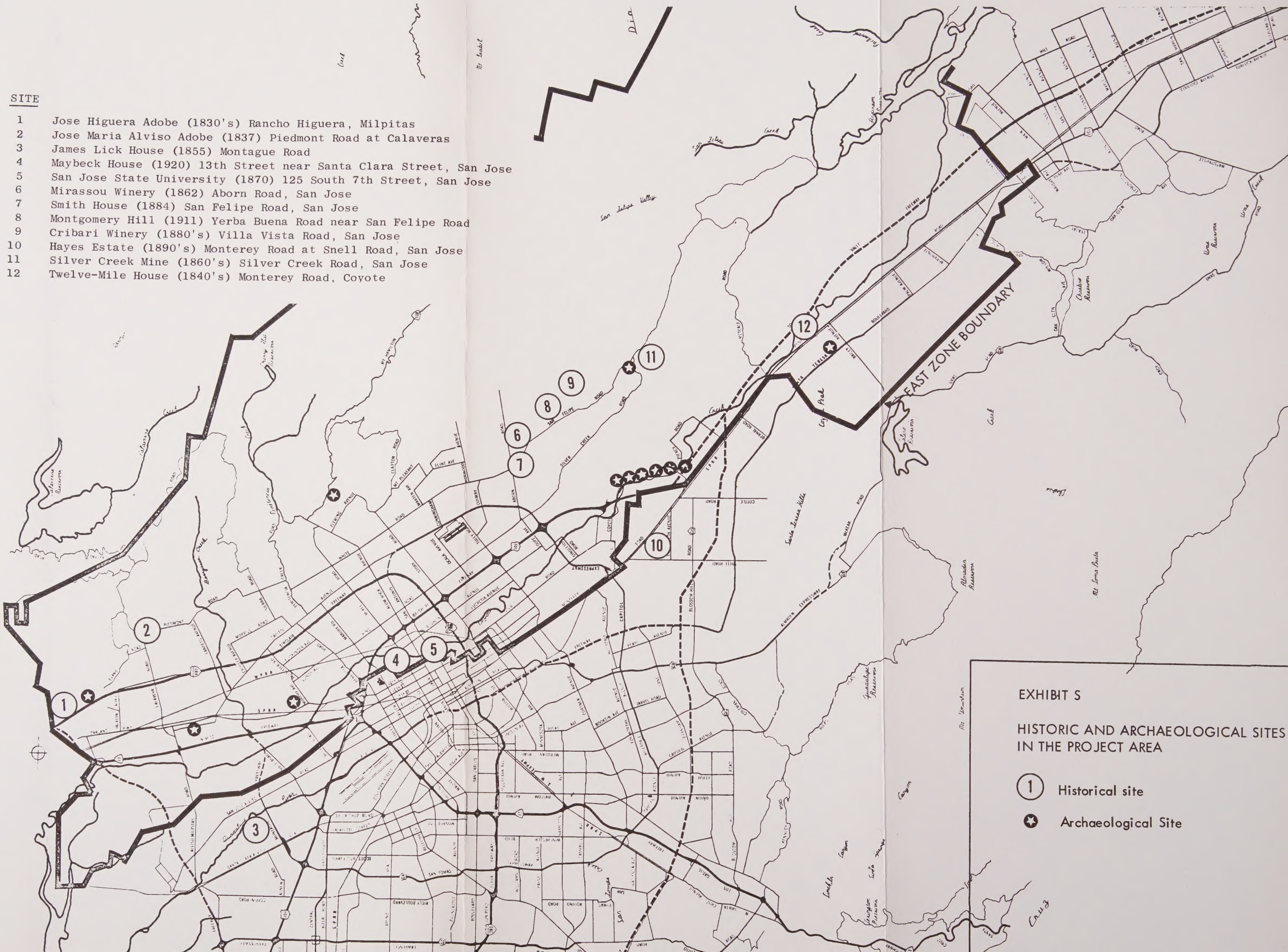
WATER DISTRIBUTION SYSTEMS IN THE PROJECT AREA

Exhibit R

SCHOOL DISTRICTS

SITE

1 Jose Higuera Adobe (1830's) Rancho Higuera, Milpitas
2 Jose Maria Alviso Adobe (1837) Piedmont Road at Calaveras
3 James Lick House (1855) Montague Road
4 Maybeck House (1920) 13th Street near Santa Clara Street, San Jose
5 San Jose State University (1870) 125 South 7th Street, San Jose
6 Mirassou Winery (1862) Aborn Road, San Jose
7 Smith House (1884) San Felipe Road, San Jose
8 Montgomery Hill (1911) Yerba Buena Road near San Felipe Road
9 Cribari Winery (1880's) Villa Vista Road, San Jose
10 Hayes Estate (1890's) Monterey Road at Snell Road, San Jose
11 Silver Creek Mine (1860's) Silver Creek Road, San Jose
12 Twelve-Mile House (1840's) Monterey Road, Coyote



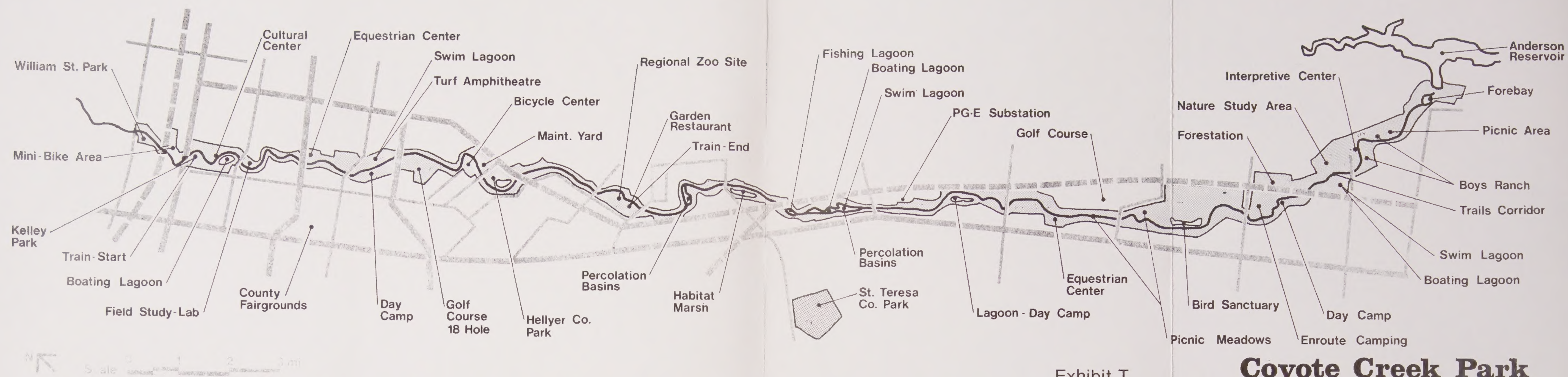


Exhibit T

Coyote Creek Park

Long Range Masterplan

Source: Ribera and Sue, Landscape Architects

Exhibit U

PENITENCIA CREEK PARK

Source: San Jose Planning Dept.

THE PLAN

As Penitencia Creek flows from Alum Rock Park to Coyote Creek, it cuts a natural and picturesque profile through the eastern foothills surrounding Santa Clara Valley, providing a natural setting for the proposed Penitencia Creek Park Chain.

The park chain will serve as a comprehensive, multi-purpose recreational and open space area conserving for future generations a ribbon of green through an otherwise sprawling urban complex.

The creekbed and its immediate environs will facilitate a recreational open space link between Alum Rock Park and the Coyote Creek Park Chain. Penitencia Creek will provide the cohesive element tying together the various recreational areas and schools in proximity to it. As part of this continuous chain, each individual recreation area will take on a greater significance within the community.

Although the park chain will be one of community significance—serving the Alum Rock and Berryessa neighborhoods—it will enhance the entire eastside of San Jose and thus serve as a regional park facility.

The lineal park will provide 200 acres of open space and recreational area—included within this acreage will be 110 acres of existing schools and parks contiguous to the creek, which will enhance the 90 acres of creek and flood plain. In addition, the existing 700 acre Alum Rock Park regional facility will serve as a focal point for the eastern end of the park chain.

The lineal park will provide a varied range of activities, generally not available in other city parks, such as hiking, bicycling, and equestrian trails, nature study areas, and lakes for fishing, swimming and small boating.